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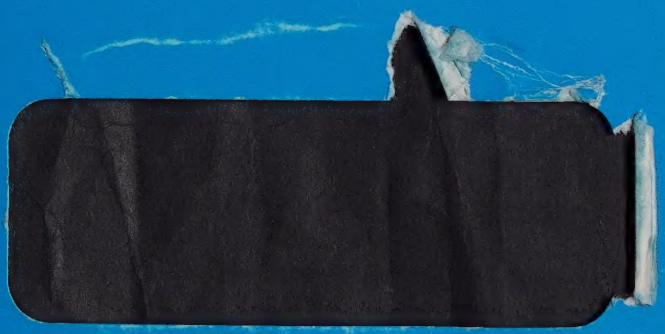

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MANUAL PART NO.
MS30-V7606-00

GOULD SERVICE MANUAL
MODEL 3600 AND 3800
INK WRITING RECORDERS

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Gould Inc., Recording Systems Division
3631 Perkins Ave., Cleveland, Ohio 44114

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INTRODUCTION

This manual contains complete information required to service and repair the Gould RS 3600 and RS 3800 ink recorders. It is intended to complement the User's Manual, part number MU30-V0202-00 which is supplied with every unit. The separate user's manual contains Sections I, II, III and IV, description, installation, operation and user maintenance, respectively.

This service manual includes a detailed theory of operation, acceptance test, internal calibrations and adjustments, and a complete parts identification section with exploded views. All schematics may be found in Appendix A in the back of this Manual.

Consult the User's Manual for installation and operating instructions, operative and preventive maintenance information, product specifications and other user information.

SECTION I

THEORY OF OPERATION

1.1 INTRODUCTION

All 3000 Series Recorders contain the same or similar modular assemblies. Operational understanding of the various models must be based on the understanding of its basic assemblies. This Theory of Operation is organized to provide assembly level operational descriptions.

Schematics are available in the appendix at the back of this manual.

1.2 CHART DRIVE BOARD 897658

1.2.1 Introduction

The Chart Drive Board (Stepper) is used in all models of the 3000 series to control the stepper motor. Proper operation of this P.C. BD. assembly is necessary for smooth linear paper motion throughout the recorder's operating speeds, .005 mm/sec to 500 mm/sec.

1.2.2 General

The Chart Drive Bd. resides in a dedicated slot of the cardcage, and interfaces to the recorder via the Motherboard backplane connector, J41. It is basically a slave to the Controller Board. The Chart Drive Board controls the stepper motor speed per data loaded into it by the controller. In addition to controlling the stepper motor speed the Chart Dr. Bd. outputs various signals to the system and user to support internal recorder functions and external features.

One of the internal functions of the Chart Drive Bd. is to accept chart drive motion detection signals from the Recorder's optical motion detector, and make a comparison to the programmed chart speed. A "MOTOR STALL" condition can then be detected and displayed to the user via the Controller and Front Panel Display.

Another internal support function is to output signals proportional to chart speed to the thermal Pen Heat Control boards. As the chart speed increases, thermal pen heat increases to maintain high quality thermal writing.

The primary external support function that the Chart Drive Bd. provides is synchronous chart speed operation with an external event or other 3000 Recorder. The user implements this master/slave feature via the "sync in" and "sync out" signals routed through the Controller's Remote connector and Front Panel Keyboard commands.

1.2.3 Description

To accomplish the primary and miscellaneous functions of the Chart Drive, a variety of state of the art circuit techniques are employed. The following discussion breaks the Chart Drive up into functional blocks to help explain it.

Schematic references are made throughout the following discussion. The Chart Drive Board schematic is 297658.

- uP Interface: The micro-processor interface block includes U1, U2, U3, U4, U5, U6 and U9.

  Together these IC's buffer all signals entering and leaving the Chart Drive Board. By buffering these signals reliable operation in noisy environments is guaranteed.

  The other task of the interface block is to generate and qualify the appropriate individual chip selects. The Controller requires these chip selects to support communication with the speed control DAC, PROGRAMMABLE DIVIDER, rewind latch and external operation latch. These chip selects are generated from the Controller's address bits, Chart Drive select signal (chart), and other bus qualifiers.

- DAC & VCO: (chart speed control Digital to Analog Converter & Voltage-Controlled Oscillator). This block includes DAC U10, VCO U37 and operational amplifiers U11 & U12.

  The Controller loads the 12 bit Digital to Analog Converter with digital data proportional to the desired stepper motor speed and desired chart speed. The output span of the DAC and its amplifier is 0.0V to -10.0V which corresponds to its digital data zero to 4000 (base 10).

  The output span of the DAC is input to the Voltage-Controlled Oscillator. A logic level pulse train is generated where at -10.0V input, the output frequency is 80,000 Hz. At the minimum frequency generated, -0.1V input, the output frequency is 800 Hz.

  Due to the variations with the VCO, calibration of this block is necessary. VCO output frequency can be measured at Test point -2 with an averaging frequency counter having a 10:1 probe.

  Zero offset is adjusted at the VCO's amplifier using R27. With minimum chart speed data loaded into the DAC, the output frequency of the VCO should be adjusted to average 800.0 Hz. Gain is adjusted by varying the reference voltage feeding the DAC with R43. With maximum chart speed data loaded into the DAC, output frequency of the VCO should be adjusted to average 80,000 Hz. Because the zero offset adjustment cannot be made with an absolute circuit voltage of zero, these adjustments are interactive and may take several iterations to get right on.

1.2.3 Description (cont.)

- PROGRAMMABLE DIVIDER: This block is composed of U13.

  The PROGRAMMABLE DIVIDER accepts the pulse train input by the VCO and divides it by 2, 120, 200 or 2000, depending on data loaded into the Controller. This DIVIDER performs the Recorder's divide-by function initiated by the Front Panel "divide by" key. It is also the means in which the dynamic range of the chart speed, 100,000:1, is attained. The customer selects the divide-by coefficient of 1, 60, 100 and 1000, with DIP switches on the controller. The controller doubles the coefficient to the Chart Drive Board because the minimum available initial coefficient is 2.

- FULL STEP PHASE CONTROL: This block is composed of a 6 bit binary counter, U14, and a phase controller U15.

  Bipolar stepper motors have 2 stator coils, SINE & COSINE MOTOR COILS, and 1 permanent magnet rotor. To force a stepper motor to rotate, a sequence of 4 flux patterns is generated by the coils. This sequence corresponds to the forced rotor movement of 4 full steps. The sequence repeats to provide continuous rotation.

  To generate 4 flux patterns from a stepper motor having only 2 stator coils, current is forced to flow in a positive and negative direction of each coil. This is what is meant by PHASE CONTROL.

  The phase controller IC is a Programmable Array Logic device which is configured to generate current steering signals for a 4 step sequence. This sequence is with respect to the 6 bit, 0 to 63 base ten, binary counter.

  The binary counter is incremented with every pulse that is fed it by the PROGRAMMABLE DIVIDER. The phase controller generates a new full current steering pattern at 16 count intervals of the binary counter.

- uSTEP WAVEFORM GENERATOR: Following the FULL STEP PHASE CONTROL block, the Chart Drives circuitry divides to independently control the SINE & COSINE STEPPER MOTOR COILS. The SINE & COSINE circuitry is nearly identical with the exception that the motor coil currents are forced to be 90 degrees out of phase.

  uSTEP "SINE" WAVEFORM GENERATOR block is composed of operational amplifier U18, ROM look-up table U19, DAC U21 and timing latch U29. uSTEP "COSINE" WAVEFORM GENERATOR block is composed of operation amplifier U18, ROM look-up table U20, DAC U22 and timing latch U30.

1.2.3 Description (cont.)

To get high resolution and smooth linear motion from the stepper motor, micro-stepping technique is utilized. Micro-stepping is the technique which simply forces a stepper motor to rotate in fractions of full step angular rotation. The 3000 Recorders use a stepper motor having 200 full steps per revolution. The Stepper divides each full step into 16 micro-steps, which allows for 3200 increments of rotation per revolution.

Micro-stepping is accomplished by forcing motor coil currents to flow in a sinusoidal fashion. The SINE & COSINE STEPPER MOTOR COIL currents have the trigonometric phase relationship of their names. STEPPER MOTOR COIL currents closely follow in magnitude to the WAVEFORM GENERATOR outputs.

The uSTEP WAVEFORMS are generated with respect to the binary count fed to ROM based look up tables, the ROM table data feeds a timing latch, which in turn feeds digital to analog converter circuitry. The outputting analog voltage feeds subsequent blocks of circuitry.

The analog to digital conversion circuitry on early revision Chart Dr. assemblies require calibration. The gain circuit adjustment for both branches of circuitry is R42. Adjust potentiometer until the DC voltage at U18 pin 8 equals 6.0V. R42 is not present on later revision assemblies.

- PWM CURRENT LIMIT: Pulse Width Modulation CURRENT LIMIT circuitry, independently controlling both sine and cosine branches, is composed of the digital frequency divider U24, set of voltage comparators U33, and set of PWM control latches U26.

  The frequency divider generates a 31,500 Hz square wave from the 1,000,000 Hz "E clock" system signal. The PWM control latches use the 31,500 Hz frequency as a "set" command. When a control latch is "set", the H BRIDGE POWER AMP block is commanded to force current through the appropriate STEPPER MOTOR COIL.

  A control latch is reset with the voltage comparator, receiving inputs from the uStep WAVEFORM GENERATOR block and the CURRENT SENSE FEEDBACK AMP block. When the feedback voltage exceeds the reference voltage, the control latch is reset and the H BRIDGE POWER AMP block is commanded to cease current flow through the appropriate STEPPER MOTOR COIL.

- H BRIDGE POWER AMP: The sine branch POWER AMP consists of NAND gating U28, intermediate totem pole drivers U39, U42 & U43, MOSFET driver set U45 and current re-circulating diodes CR6, CR7, CR8 and CR9. The cosine branch POWER AMP consists of NAND gating U28, intermediate totem pole drivers U40, U42 & U44, MOSFET driver set U46 and current re-circulating diodes CR10, CR11, CR12 and CR13.

1.2.3 Description (cont.)

The NAND gating accepts phase control signals from the FULL STEP PHASE CONTROL block and current limit signals from the PWM CURRENT LIMIT block. Per these inputs NAND gating drives the totem pole drivers which in turn drive the MOSFET drivers. The MOSFET's are driven in pairs to control which direction current is forced through the STEPPER MOTOR COILS, and Pulse Width Modulated to limit the current to the desired average level.

Current re-circulating diodes are incorporated in the circuit to steer the decaying STEPPER MOTOR COIL currents during the H BRIDGE off times back into the power supplies. The resulting overall power savings is considerable.

- CURRENT SENSE FEEDBACK AMP: The sine and cosine branch FEEDBACK AMPS are independently composed of sets of operational amplifiers U35 & U38.

  Power feeding each H BRIDGE POWER AMP block is sensed via a 0.1 ohm resistor, then differentially amplified, then amplitude amplified, then rectified and finally filtered. As previously mentioned, this block feeds the PWM CURRENT LIMIT block.

1.3 MOTHER BOARD 897650, 897651 & 897517

1.3.1 Introduction

This set of mother board assemblies is used in the 3000 recorder product line. These boards act as a backplane to the cardcage portion of the recorders.

The 897650 supports the 2 channel frame size cardcage.
The 897651 supports the 4 channel frame size cardcage.
The 897517 supports the 8 channel frame size cardcage.

1.3.2 General

These boards provide the signal paths and will tie together all of the primary electronic assemblies of the recorder. These boards only pass signals; they are passive assemblies having no active components.

1.3.3 Description

The mother boards in conjunction with the mother-in-law boards tie together all the primary and secondary electronic assemblies of the recorder.

System schematic diagrams and mother schematic diagrams clearly illustrate the who's, what's and where's of all connections.

1.3 MOTHERBOARDS 897650, 897651 & 897517

1.3.3 Description (cont.)

The 2 channel frame size mother schematic is 297650.
The 4 channel frame size mother schematic is 297651.
The 8 channel frame size mother schematic is 297517.

1.4 MOTHER-IN-LAW's, 897811-1, 897812-1 & 897813-1

1.4.1 Introduction

This set of Mother-in-Law (MIL) and assemblies is used in the 3000 recorder product line. These boards act to interconnect most of the electronic assemblies located in the transport half of the recorder.

The 897811-1 supports the 2 channel frame size Transport Assembly.
The 897812-1 supports the 4 channel frame size Transport Assembly.
The 897813-1 supports the 8 channel frame size Transport Assembly.

1.4.2 General

These boards provide a signal path and ultimately tie together all of the secondary electronic assemblies of the recorder. Signals that need to interface to the recorder's primary electronic assemblies are grouped and travel to the cardcage half of the recorder via mass termination ribbon cable assemblies.

Aside from interconnecting assemblies, these MIL's provide coil drivers for the inner-channel event markers and ink solenoids. By providing these drivers, the number of high current paths running between the cardcage and transport assemblies is minimized.

The similarity between the MIL assemblies is considerable. The 2 channel MIL is a subset of the 4 channel. The 4 channel MIL is a subset of the 8 channel.

1.4.3 Description

The MIL assemblies, in conjunction with the mother boards, tie together all the secondary and primary electronic assemblies of the recorder.

System schematic diagrams and MIL schematic diagrams clearly illustrate the who's, what's and where's of all bussed signals.

The 2 channel MIL schematic is 297811.
The 4 channel MIL schematic is 297812.
The 8 channel MIL schematic is 297813.

1.5 DUMMY INTERFACE CL-810312

The Interface Assembly standard to the 3000 recorder product line resides in a dedicated slot, J43, of the recorder's card cage.

Via its "preamp connector", digital data and analog signals are interfaced between the recorder and 5900 preamp cardcage. Preamp definition and configuration data, printed out on the recorder's optional inner-channel annotation heads, takes this path.

The Standard Interface also connects all analog signal grounds to the recorder's signal common. This grounding path is required on all models, regardless of preamp configuration.

1.6 +/- 15V POWER SUPPLIES 497867

The majority of power consumed within the recorders is supplied from the +/- 15v supplies. The rate of consumption will vary depending on the operating frequency and amplitude of the penmotors. Nearly every electronic assembly within the recorder consumes at least a little power from these supplies.

The dual supply that provides this power is used across the product line. They are designed in such a way that they can be paralleled. Two and three identical supplies are installed in parallel in the larger model Recorders. They reside in dedicated slots within the recorder's cardcage. The actual number of required supplies will depend on the recorder's frame size, configuration and installed options, and not necessarily on the number of available dedicated slots.

An additional benefit of the supplies is that when operating in parallel they are designed to share their load evenly. This promotes a cool operation, which in turn promotes long life.

1.7 SERVO PEN DRIVE AMPLIFIER 897406

1.7.1 Introduction

This circuit board consists of two identical amplifier channels, plus a few common components associated with the digital controlled pen position, pen polarity and power output enabling circuitry.

1.7.2 Description

Each amplifier channel utilizes three proprietary modules with the following functions:

1.7.2.1 Oscillator / Demodulator Module 297498 (U2)

This module contains a 20 KHz sine and square wave source, a linear phase-sensitive demodulator, a filter and a buffer amplifier. This module supplies excitation for the Metrisite position sensor built into the penmotor and demodulates the Metrisite AC output into a DC position signal using a filter and buffer amplifier.

1.7.2.2 Servo Control Module 297499 (U1)

An external dip switch controlled attenuator accommodates +1, +2.5 or +5 volt signal inputs to the control module. This signal is summed in an operational amplifier with an external +5 volt pen positioning signal and fed to a limiter circuit which electronically stops the input "command" signal from driving the pen into the mechanical pen stops.

This limited input signal is modified by adding an adjustable portion of a velocity signal from the penmotor and a derived pen acceleration signal. In addition, an adjustable compensation network is used to modify the amplitude of the input signal as a function of signal frequency.

Finally, this modified input signal is compared to the DC position signal derived from the penmotor Metrisite sensor. The resulting + or - difference signal is used to modulate the on-time of a 20 KHz square wave. The resulting output can vary from zero to 100% on-time. The output signal has a value of +10 volts for a small error signal of one polarity and -10 volts if the error is of the opposite polarity.

As the error gets still smaller, the output becomes a voltage which switches between +10 volts at a 20 KHz rate. At zero error between the modified input signal and the feedback position signal from the Metrisite, the output is 50% on-time square wave at TP-5.

The U1 module also includes circuitry which monitors the amplitude of the sine wave which excites the Metrisite. The purpose is to disable the output stage in the third module if the 20 KHz oscillator fails. (If the feedback signal goes to zero, the pen position is unknown and the amplifier output goes full on.)

The disable output also drives the command input signal to zero on a normal "stop" signal from the recorder's controller, which causes the pen to center on the chart; the output is then disabled to make the pen go limp.

One more feature of this module is a circuit to provide a buffered output for tape or other monitor. This "monitor" output can be polarity reversed with the dip switch on the 897406 board.

1.7.2.3 Power Output Module CL-810380 (U3)

This circuit includes the drivers and Hybrid "H" Bridge, a MOSFET switching circuit (which alternately connects the penmotor drive coil from +15 to -15 volts, reversing the drive at a 20 KHz rate). Due to the inductance of the drive coil, only a tiny current has time to build up on each polarity reversal. The average current is zero, if a 50% square wave is impressed. If, however, the waveform becomes asymmetrical, appreciable currents of up to 2.5 amperes will flow through the 10 ohm penmotor. Since the power reversing switches are very low resistance when conducting (0.2 ohms) and open circuit otherwise with the square wave drive, very little power is actually dissipated in the MOSFET switches and the circuit efficiency is high. In addition, control is very linear through the zero average current condition, so that pen hysteresis (lack of pen stiffness) at crossover is overcome.

Also in this module is a MOSFET switch which disconnects the negative supply to the Hybrid bridge when the U1 module zeros the Enable input to the output module. It includes a time constant which works with the FET clamp Q1 in the 297499 module to make the pens zero center before losing power on "STOP".

1.7.2.4 Power Supply Circuits

Each channel on the Pen Servo board has its own +12 and -12 volt regulated supply for the low level circuitry. Both +12 volt supplies power the 5 volt regulator used for powering the digital circuitry.

This separate regulation insures against interaction between channels.

Circuit breakers are used to protect the individual penmotors from extended overloading or affecting all channels by shorting the system power supplies. They only protect the output modules.

1.7.2.5 Digital Circuitry

Individual 12 bit digital to analog converters (AU4 and BU4) are addressed by 4 bit bytes from the system controller. Their outputs supply 0 to +5 volt signals to operational amplifiers (AU5 & BU5). The amplifiers level shift and double the output to the -5 to +5 volt level required by the Servo Control module pen position input.

1.7.2.5 Digital Circuitry (cont.)

Digital chip U8, also is addressed by the system controller. Its four outputs are individually selected by the two input bits applied to board terminals 22 and 23 and the strobe on pin 15. Latches (U9) turn on and off relay K1A or K1B and control the pen polarity of channels "A" and "B". These latches can be "reset" to an initial condition via the system reset on board input pin 27.

The other two outputs of U8 enable the A channel or B channel D/A converter when a change in the pen position is requested via the control panel push buttons. U5 converts the 0 to +5 volt output of the D/A to +5 volts to swing the pen position through full scale chart deflection.

Transistor Q10 is used to ground the channel enable (pin 10 of U1) of both channel A and B. Both channels disable when board pin 26 is at +5 volts.

1.7.2.6 Miscellaneous

Super stable amplifiers AU11 and BU11 amplify the filtered velocity signals from the penmotor velocity coils by a factor of 6 and are used only with Thermal writing recorders. Trim potentiometers AR40 and BR40 are used to adjust the offset of these amplifiers to compensate for DC errors at the pen heat control circuit board which cause the trace darkness to differ depending on the direction of pen travel.

The 20 KHz "Sync" signal input is essential on multi-channel 3000 series recorders to prevent tiny magnetic leakage fields between penmotors from causing audible, and sometimes, visible pen modulation (beating) at the different frequencies. A small portion of a crystal controlled 20 KHz derived from the micro-processor 1 MHz clock is fed to each U2 chip pin 16 from a Motherboard bus on pin 88. This signal locks all channel oscillators to exactly 20 KHz eliminating the beat frequencies which would affect "span" calibration. (Note: Copper shields are used between penmotors to curb flux leakage.)

R6, labeled "Sq. Wave Comp.", is used to center the pen in the channel to compensate for mechanical offsets in the chart paper location and pen linkage/Metrisite tolerances. The electronic limiter adjustments may run out of adjustments range and the linearity suffer if R6 is not preset within one or two chart divisions at calibration with the pen position input zeroed.

1.8 +5V POWER SUPPLY 897515

1.8.1 Introduction

This assembly is used in all 3000 recorders. It resides in a dedicated slot, J31, in the recorder's cardcage.

1.8.2 Description

Aside from providing +5 volt power, 30 watts, for all the recorders logic circuitry, several other functions are provided. They are as follows:

1. Fuse and switch the A.C. line power for the recorder.

2. Provide input line filtering. Line filtering is a primary concern when extending the operating frequency of the recorder to 47-440 Hz. Both the power supplies and the line filter will physically handle high frequency operation, but at 400 Hz the line filter's leakage current exceeds the 500 micro-ampere safety limit set down by U.L. and I.E.C.. To operate the recorder at 400 Hz one must either accept 2 milli-ampere common mode leakage @ 120 VAC line, or specify a different line filter. Note: Common mode interference rejection is reduced as leakage current is restricted.

3. Provide user configurable, input line voltage selection via the voltage selection PCB card. The selected voltage is visible through the back panel window. The nominal voltage selection choices are 100 VAC, 120 VAC and 240 VAC. Functionally, the voltage selection card routes the A.C. line power to the +/- 15V supplies, the on-board +5V supply and the 13 VAC isolation transformer (used only in the 2 & 4 channel frame size models).

C A U T I O N:

All the recorder's power supplies will fail if the recorder is configured for 100 VAC or 120 VAC and the user inputs 220 VAC or 240 VAC.

4. Battery backup power stored in the battery holder is a AA 3.5 volt lithium cell, used to retain continuous accuracy of the Controller's real time clock.

5. The on-board Direct Current to Alternating Current voltage converter, U1, is used to provide dedicated power for the Vacuum Fluorescent Display used by the front panel.

6. Cardcage fan speed control is accomplished by a temperature actuated reed relay. Fan speed is switched from low speed to high speed when cardcage temperature reaches 40 degrees centigrade. The purpose of fan speed control is to limit fan noise.

7. A 20 KHz servo amplifier sync signal is generated and output to the servo amplifiers to synchronize the servo motor chopper circuitry. This accomplishes quiet pen motor operation.

1.9 CONTROLLER 897637

1.9.1 Introduction

The Controller Board is the heart of the unit. This board processes all the internal and external information to the unit. The 6809 microprocessor (uP) on the Controller Board has the ability to "talk" to every circuit board in the unit. It does this via the data bus (D7-D0) and the chip and board select signals (PAPER, CHART, INFCE, etc..). Through inquiry to these boards, the processor can determine such things as which button was pressed, what command was sent over the interface, how much paper is left in the unit, and other pieces of recorder data.

1.9.2 Description

The processor system consists of the 6809 microprocessor (U1), data bus driver (U4), address bus and control signal driver (U3), and master clock oscillator (Y1). The 6809 controls virtually all of the recorder functions through the execution of the control program which resides in EPROM (U9). The other sections of this board are the address decode circuitry, real time clock, memory, interrupt logic, event/timer marker logic, standard annotation head logic and driver, watchdog timer for both annotation head and microprocessor operation, remote connector logic, preamp communication logic, and trigger level circuitry.

Address decode circuitry consists of the address decoders (U5, U6, U7, U43) and the gating to create the valid read enable, valid write enable, and valid memory address (VRE-, VWE-, WMA-) signals (U15, U16, U17, U32).

The Real Time Clock consists of U11, Y2, C2, C3, Q2 and R10. Each digit is individually addressable by the microprocessor and can be changed. Backup voltage is supplied by a "AA" size battery located on the +5v Power Supply board (P/N 897515) through J1-60.

The memory on this board consists of 512 bytes of non-volatile RAM (NovRAM U10) and 2K bytes of CMOS RAM (U40). All control settings, test numbers, run times, pen positions, user messages, pen polarities, etc.., are stored in this NovRAM. Upon power up, the uP reads the cold start/warm start switch (SW1-1). If in cold start, the uP will fill the NovRAM with default information and values. If in warm start, the uP will do a non-volatile recall of the NovRAM and use the last saved set of conditions from when the recorder was powered down to set up the recorder. In this way, the recorder will power up exactly as it was powered down previously. The CMOS RAM is used to store inter-channel messages, preamp status and as a general scratch pad memory.

The Interrupt Buffer and Logic (U26 and U27) allow a means for the other boards in the unit to communicate with the uP. All the incoming interrupts are gated together using U26. A LOW on any line will generate an IRQ- to the uP. The uP reads the buffer at U27 and, using the byte read, determines the interrupting device.

1.9.2 Description (cont.)

The Event/Timer Marker logic consists of 2/3 of U12, U13, U14 and U17. One timer on U12 counts a uP programmed number of 1 MHz E-clock pulses. On reaching this number, it issues a pulse to another timer on U12 which actually creates the timer pulse. This pulse deflects the timer marker in the desired direction in accordance with the steering logic of U13. U13's job is to determine when to direct the tenth pulse to the right event coil rather than the left coil. In this way we get our bi-directional timer marks. U14 and U17 allow LEFT MARK and RIGHT MARK from the front panel as well as R EVENT and L EVENT from the REMOTE connector to be gated in with the timer marks.

The Standard Annotation Head logic and driver consists of the other 1/3 of U12, U19 and U20. Upon receiving an interrupt from the Chart Drive board (via J1-32 to U39A, pulling down the FIRQ- line), the uP will write the next raster of data to be printed on the standard annotation head to the latch which is U19. This also triggers the countdown timer on U13 which counts a pre-programmed number of 1 MHz (1 ms) pulses (which is a function of the present chart speed) and then issues a CLR- pulse to U19. The Darlington drivers in U20 pull down on the elements to be printed for that amount of time.

The Watchdog Timer circuit is essentially a two-fold operative circuit. It monitors both annotation head on time and uP memory access frequency. First, the act of writing to the annotation head latch (U19) also triggers the annotation head watchdog by toggling U36A (a D-type F/F wired as a T-type). This allows Q-clock pulses to be counted by U37. If U37 counts 1024+512=1536 pulses (or usec) before getting a CLR+ pulse via U15-6 (which is initiated by the same CLR- pulse from U13 that clears U19), U15-3 goes low and is clocked over to the RESET line via U36B and U32. The processor is reset along with the annotation latch and the head is saved from burning out. Second, should the uP NOT access the program memory (U9) at least once in a 50 usec period (signified by CODE- going low, thus clocking U35A), a RESET will be issued via U35B-5 and U32.

The Remote Connector buffer provides an input port for remote connector inputs (S2-, S1-, S0-, D1-, D0- & REMOTE-). By monitoring these signals when REMOTE- is pulled low, the uP can make the recorder run at the speeds specified by the speed and divide-by bits. Speeds are per the table on the following page:

1.9.2 Description (cont.)

S2-	S1-	S0-	Base Speed Selected
0	0	0	500 mm/sec
0	0	1	250 mm/sec
0	1	0	100 mm/sec
0	1	1	50 mm/sec
1	0	0	25 mm/sec
1	0	1	10 mm/sec
1	1	0	5 mm/sec
1	1	1	EXTERNAL

D1-	D0-	Divisor Selected
0	0	/100
0	1	/60
1	0	/1000
1	1	/1

The Preamp communications logic (U39B, U42, U43) allows the uP to communicate with the Interpreter board in order to obtain preamp status information for inter-channel annotation or, in the cases of 3200 and 3400 chassis, to pass commands to the preamps which are received via the recorder's RS-232 or IEEE-488 interface. When the uP writes to the Interpreter through bi-directional U42, it generates an interrupt to the Interpreter. The uP monitors this line until it goes high again, indicating the Interpreter has taken the byte. The uP then is able to write the next byte of data. This process works in reverse when the Interpreter talks to the uP on this Controller board.

The Trigger Level Circuit (U8, U25, U28 & U29) functions as an amplitude triggering circuit. After a trigger level is set and entered using the pen position controls for channel 1 as outlined in the User's Manual, this level is written to U25. U25 works in conjunction with U28, creates an analog level corresponding to this code and presents it to the comparator (U29). When the analog level at U29-3 exceeds this TRIGGER level, an interrupt is generated by U8 to the uP IRQ line. The greater than/less than status of the trigger level is monitored by the processor via U41-13 on D5.

1.10 KEYBOARD 897843-1, -2, 897844-1, -2, -3, 897783 and CL-810186

1.10.1 Introduction

The Keyboard is responsible for the Vacumn Florescent Display (VFD) drive, and keyboard data entry.

Refer to following Schematic Diagrams:

RS 3200	297843
RS 3400	297844
RS 3600	CL-210186
RS 3800	297783

1.10.2 Description

The main keyboard is scanned by U2 which also controls U3 and uses it to help in this scan. When a key is pressed, U2 detects the short and, after 1 10 ms debounce, confirms the depression. It creates the unique code for that particular key and generates an IRQ- interrupt to the Controller Board via U4. The Controller (P/N 897637) can then read this code using U1 and U9 to create the proper strobes. U2 has an 8 byte memory for key press storage and is RESET on power-up and whenever the STOP key is pressed.

The Pen Position keypad is scanned by U7 in much the same manner as U2 scans the main keyboard. However, the line which generates the IRQ- interrupt to the Controller from U7 stays low as long as a pen position key is being held depressed. In this way, the Controller uP can monitor the length of time a pen position key has been pressed and move that pen faster the longer the key is held down.

The VFD is driven by U10, U11, U12, U13 and U14. The uP on the Controller Board sends the 5x7 bit pattern of the data to be displayed to U10 (which is cascaded to U11 and U12). After this data is sent, the bit pattern for turning "ON" the proper anode for this particular character is sent to U13 (which is also cascaded to U14). When all information is fed to these chips, the Controller issues the LATCH commands (BLATCH AND GLATCH) which displays this data as an ASCII character. The entire process is then repeated for the next characters until the entire 16 character message is displayed. This entire process is repeated as long as the message is to appear in the display.

1.11 PAPER SUPPLY/INTERLOCK/MOTION SENSORS

1.11.1 Introduction

The 3000 Recorder incorporates photo-sensors to measure the remaining supply of chart paper and detect a paper out condition.

1.11 PAPER SUPPLY/INTERLOCK/MOTION SENSORS

1.11.2 Paper Remaining Sensors

There are five reflective photo-sensors mounted on a PC board behind the metal plate on the left side wall of the 3000 paper compartment. These sensors view the left end of the supply roll of chart paper (or the left end of a stack of paper) in the compartment. Each sensor contains both a source of infrared light and a photo detector.

The five sensors are located in an inverted "L" pattern so that they work for both fan-fold and roll paper and sense the presence of the white edge of the paper roll or stack. The vertical row of sensors views the height of the fan-fold stack and the horizontal row of sensors views the diameter of the roll paper.

The present controller software only makes use of the end two sensors on each leg to determine three conditions of paper supplying remaining. If both sensors are "seeing paper", the controller will cause the panel display to read "SUPPLY = 100% - 50%". If only the end sensor "sees" reflected IR light, the panel display reads "SUPPLY = 50% - 25%". When no sensor receives reflected IR light the display will read "SUPPLY = 25% - 0%".

The sensors are NPN photo-transistors which are high resistance for dark condition and low resistance for the illuminated condition. Approximate operating distance for the sensors is .12 to .3 inches. Each signal is buffered separately by U4 located on the 897635 Paper Supply board and sent to the controller via the Mother-in-Law board and backplane circuits. Sensors are paralleled for the fan-fold and roll functions.

1.11.3 Paper Out Sensor Board (Refer to Circuit Diagram CL-210240 & 297912)

The CL-810240 board is mounted to the left side plate on a small bracket just above the top left edge of the recorder's writing table - just before the paper reaches the top roller.

Its purpose is to send an interrupt to the recorders controller and shut the system down before the paper end reaches the pens or Annotation Head. These items may be damaged by overheating, in the case of Thermal recorders, or damage the rubber roller on which they write. On ink units, the interrupt generated shuts down the inking system as well as the chart drive. It will also sense gross mis-threading of the chart paper.

The "Paper Out" sensor incorporates a transistor current amplifier to increase its sensitivity distance to .12 to .5 inches. The sensor still acts as a varying resistor and is connected in series with the "Table Open" sensor. Either sensor, deprived of a reflected signal will cause U4 on the 897635 Paper Supply board, which buffers this interrupt signal, to pass it on to the Mother-in-Law backplane board where it goes to the controller bus.

1.11 PAPER SUPPLY/INTERLOCK/MOTION SENSORS

1.11.4 "Table Open" Detection (Part of Cable Assembly 897912)

A reflective sensor views the bottom left edge of the writing table as it swings into the operating position. Since the photocell is in series with the Paper Out sensor it also prevents the annotation head(s) and pens from writing and the chart drive from operating by generating a system interrupt.

1.11.5 Speed Monitor Board (Schematic Diagram CL-210290)

Attached to a shaft driven by the stepper motor is a transparent disk with an opaque mark every 3 degrees of rotation on its outside edge. The edge of the disk moves in the gap of an "interrupter sensor" which has an infrared source on one side and a photo sensor with a .010 x .020 inch viewing area. For every .014 inch of chart paper movement the sensor sees one light pulse and uses a Schmitt trigger circuit to square up the waveform.

NOTE:

The Mother-in-Law board supplies the pull-up resistor required on Board P/N CL-810290.

This sensor serves two functions:

a. It is a stepper motor "stall" detector used by the controller -- if the motor is supposed to be stepping and these pulses do not occur, the controller microprocessor is programmed to recognize this condition and it will attempt to ramp the motor up to speed three times before displaying a "stall" error message. A broken belt or loose motor pulley will also be detected.

b. It serves as an "arming trigger" for the annotation head "write" function. Unless one or more pulses occur between the last write command and the time when the head is supposed to write again, the paper has not moved under the head and write commands are inhibited. Annotation heads write each .016 inch of paper (32 motor micro steps). If heads write too often, overheating and damage may occur.

1.12 INTERCHANNEL ANNOTATION CL-810191

1.12.1 Introduction

The Interchannel Annotation Driver board is the board which drives the interchannel annotation heads. This board is required if interchannel annotation is desired in either ink or thermal units. Each board will support two (2) interchannel annotation heads.

1.12.2 Description

The microprocessor on the Controller Board (P/N 897637) writes the raster of interchannel annotation data to be printed for a particular channel to the proper octal latch (U1 and/or U2) on the interchannel annotation driver board. The outputs of these latches enable Darlington drivers U3 and U4 which pull the proper elements of the heads in question to approximately +1.5v thus creating the marks on the paper as needed. After printing for a programmed amount of time, which is a function of present chart speed, the uP on the Controller board then clears latches (U1 & U2) to prepare for the next raster to be printed.

Since the heads come in three basic grades (A, B & C), the voltage across them becomes a function of the head power efficiency. Diodes (CR2, CR3, CR4 & CR5) are voltage dropping diodes either put in series with or shorted out of the power line. The flex cables are punched with holes according to the head grade which opens connections to these diodes. In this manner, any grade head can be used with any driver.

SECTION II

CALIBRATION

2.1 INTRODUCTION

This section provides the performance test, mechanical adjustments and electical calibration procedures for the Gould 3600 and 3800 Ink Recorders. The performance verification test compares the recorder's performance to its specifications. The performance test is recommended as an acceptance test when the unit is first received, and later as a verification of the recorder's accuracy at scheduled calibration periods. It is recommended that the performance test be run and the results recorded prior to attempting any electical calibration of the unit. The calibration procedure should be performed after repair of the recorder and/or when the unit fails the performance test. If the recorder will not respond to, or meet the limits of the calibration procedure, repair is indicated. The recorder must be allowed to warm-up for at least 15 minutes before starting the performance verification test or the calibration procedure.

2.2 EQUIPMENT REQUIRED

a. Gram Gauges for 0 to 50 and 0 to 150 ranges
b. D.C. Calibration Source
c. Function Generator
d. DVM
e. Oscilloscope
f. Frequency Counter
g. Remote input connector - Gould Part No. 244550-37, supplied with recorder
h. Signal input connector - Gould Part No. 245537-37, supplied with recorder
i. Annotation head "Alignment Gauge" Gould #CL-211327 (.010" feeler gauge)
j. Extender card - Gould part No. CL-210472
k. Meterstick
l. Multiple spline wrench - Gould Part No. 1-120922-2

NOTE:

Allowed the recorder to warm-up for at least 15 minutes before starting the performance verification test or the calibration procedure.

2.3 MECHANICAL/VISUAL INSPECTION

2.3.1 Before Power-Up

Check for obvious defects such as loose hardware or handling damage.

Inspect push buttons for alignment, nomenclature and non-binding operation, sliding pushbutton covers for smooth operation.

Check orientation of line voltage selector (View thru opening on the 5 volt supply - below line cord).

Inspect for free movement of annotation arm(s), on to the writing table. They should be spring loaded toward the table silicone roller at 100 grams pressure.

2.3 MECHANICAL/VISUAL INSPECTION (cont.)

2.3.2 Power Off - Chart Paper Tracking Stabilized

Check pen tip at the center of its channel for proper length. All pen tips should write within 1/2 mm of each other and parallel to the chart time lines within 1/8 mm total skew. Pen skew is a deviation from the proper time line as the pen tip is moved manually to the left and right extremes of its channel.

Check pen pressures to be 30 +/- 5 gm for ink analog pens. Also, 30 gm +/- 5 for event pen(s). Measure with spring gauge hook at pen tip held at 90 degrees to the paper surface.

Check mechanical pen stops by manually moving each analog pen to its right and left mechanical limits to assure the pen tip excursion is 2.0 to 2.5 mm beyond the chart edge. Exception is channel 1 left edge which should be at least 1 mm beyond edge.

Check each event marker pen tip for alignment on chart event "ladder" printed on the chart paper. Mechanically, the base of the marker assembly is squared to the "Bumper strip", on the recorder. The pen is turned to center the pen tip on the chart event "ladder" by loosening the two #0 screws securing the pen to its mounting. Event pens deflect left and right and should be adjusted within 0.1 mm of "ladder" center after the paper tracking has stabilized. All event markers are to be tested for proper 1 to 1.5 mm deflection and operation after power is applied via the TTL inputs on the remote connector.

2.4 PERFORMANCE TEST PROCEDURE

2.4.1 General

The following performance test systematically checks each function of the recorder. The performance test can be run completely as an acceptance test or partially if certain functions are in question. To ensure optimum results, the performance test should be conducted at an ambient temperature between 20 to 30 degrees Centigrade, with relative humidity of less than 70%. If the recorder has been brought indoors from the cold allow it to completely warm to ambient temperature before applying power.

2.4.2 Preliminary

Install chart paper in the recorder. Refer to Section IV of the 3000 User's manual for details on paper loading.

Set rear panel switches as follows: (Toward the PC board is ON)

Servo boards:
SW position 3 ON
SW positions 1, 2, 4, 5, & 6 OFF

Controller board:
SW positions 2 OFF
SW positions 1, 3 & 4 ON

2.4.2 Preliminary (cont.)

Cold start the recorder by turning power switch on, Display will read "CHECKSUM= " with a 4 digit hexidecimal number following equal sign.

Turn power switch off and set position 1 of the Controller board to OFF. Turn power switch on, Display should read "STOP".

2.4.3 Front Panel Controls

Press "5" button. Chart will run at 5 mm/sec and display reads "5 MM/S".

Press "10" button. Chart will run at 10 mm/sec and display reads "10 MM/S".

Press "25" button. Chart will run at 25 mm/sec and display reads "25 MM/S".

Press "50" button. Chart will run at 50 mm/sec and display reads "50 MM/S".

Press "100" button. Chart will run at 100 mm/sec and display reads "100 MM/S".

Press "250" button. Chart will run at 250 mm/sec and display reads "250 MM/S".

Press "500" button. Chart will run at 500 mm/sec and display reads "500 MM/S".

Press "STOP" button. Recorder should decelerate to STOP. Display reads "STOP".

NOTE:

In the following keypad tests, each time the "SET" button is pushed, the display will indicate "FUNCTION TO SET?". If you desire not to set a function after the key is pushed, depress the "STOP" key.

2.4.4 Var Speed

Depress the "SET" pushbutton.

Depress the "CHART SPEED" function key.

Enter "15 MM/S" by pressing the "1" and "5" keys on the numeric keypad.

Depress the "ENTER" function key.

Depress the "VAR SPEED" pushbutton on the top level controls. Recorder should run at 15 MM/S.

Repeat above steps entering 135 mm/sec instead of 15 mm/sec.

Press "STOP" to stop the recorder.

2.4.5 Date

Depress the "SET" mode button.

Depress the "DATE" mode button. The display will read "DD-MMM-YY".

Enter the date from left to right in Day, Month, and Year format using the keypad. The shift key does not have to be used.
Example: "01","JAN","88"

Depress "ENTER" function key.

2.4.6 Time

Depress the "SET" mode button.

Depress the "TIME" mode button. The display will read "HH:MM:SS".

Enter the desired hours, minutes and seconds from left to right using the keypad. The shift key does not have to be used.

Depress "ENTER".

Depress the "TIME" button and verify on the display that the time is correct and the clock is running.

Depress the "DATE" button and verify on the display that the date is correct.

2.4.7 Pen Position Check

Run the recorder at 5 mm/sec. On channel 1, push and hold the left pen position button. The pen should move to the left, slowly for a few seconds then at a faster velocity as long as the button is held.

Push and hold the right position button. The pen should move to the right, slowly for a few seconds then at a faster velocity as long as the button is held.

Position the pen to the center of the chart. Each short push will move the pen only a small amount for precise settings.

Repeat for all analog channels.

2.4.8 Trigger Level

NOTE:

RUN TIME & CHART SPEED must accompany the trigger level setting. RUN TIME is the length of time that the programmed chart speed is to run after the SET TRIGGER is exceeded. The run time can be set between 00-99 seconds. The trigger level input is pin 31 of the remote control connector on the controller board.

Set the recorder to "STOP". Apply a ground (0V) to pin 31 on the remote connector. Both pins 29 and 30 are common.

Depress the "SET" pushbutton.

Depress the "CHART SPEED" pushbutton.

Enter 15 mm/sec by pressing the "1" and "5" buttons

Depress the "ENTER" button.

Depress the "SET" button.

Depress the "RUN TIME" button.

Enter 5 seconds by pressing the "5" key.

Depress the "ENTER" key.

Run the chart at 5 mm/sec and depress the "SET" button".

Now depress the "TRIGGER LEVEL" button. Using the pen position control buttons for channel 1, position the trace to 10 divisions left of chart center in channel 1.

Depress "ENTER" button. The position will be stored and the trace will return to its original postion on the chart.

Depress "STOP".

Connect the + terminal of a variable DC supply (0-5) to Channel ONE analog input (+) and to pin 31 (-) on the remote connector. Connect the - terminal to Channel ONE common and to pin 29 or 30. Set for 0V.

Run the chart at 5 mm/sec. Toggle the "TRIG LEVEL" button several times and note message "TRIGGER OFF" AND "TRIGGER ON" will be displayed. Leave in "TRIGGER ON".

With chart running, slowly increase the DC input voltage. When the input voltage reaches 10 $\pm$ 1 divisions left of chart center, the recorder will run at 15 mm/sec. Immediately reduce the input voltage to 0V. After 5 seconds the chart will revert back to 5 mm/sec. Accuracy of trigger level voltage is apx. 10%.

Retrigger the unit and leave the voltage applied. Note the chart will continue to run at 15 mm/sec as long as the level exceeds 10 divisions. Set the level to 0V and the recorder will revert to 5 mm/sec.

2.4.9 Event Timer

Depress the "SET" button.

Press the "EVENT TIMER" several times, noting that the display will indicate various settings plus TIMER OFF. Check that the following settings appear: .1 Second, 1 second, 10 seconds, 100 seconds, .01 minutes, .1 minutes, 1 minute TIMER OFF. Stop at setting of 1 SECOND and press" ENTER" to lock 1 second timing marks into memory.

With the recorder running at 5 mm/sec ensure that the right event marker operates at the setting entered.

Press "SET" then "EVENT TIMER" several times until "TIMER OFF" appears. Then press "ENTER" and note the timer stops. Stop the recorder.

2.4.10 Rewind

Press "REWIND" and note that the message "OPEN TABLE FIRST" appears in the display.

Gently open the writing table making sure pens are not caught on the paper. Also note that "INTERLOCK" message will appear in the display.

Depress the "REWIND" button. The chart roll should rewind at 50 mm/sec for about 6 seconds and stop.

Close the table and run several feet of paper out at about 50 mm/sec to re-center the paper on the table. Press "STOP".

2.4.11 Test Number

Depress ""SET" button.

Depress "TEST NO" button.

Enter 84 by pressing the "8" and the "4" buttons on the keypad.

Depress "ENTER".

2.4.12 User Message

Depress the "TEXT" pushbutton. The display should indicate USER MESSAGE >. Please note that pressing the "TEXT" key will erase contents of the message buffer. The buffer has a capacity of 256 characters.

Depress the "SHIFT" pushbutton to obtain the status of letters or numbers. The display should indicate "SHIFT ON" or "SHIFT OFF" depending on the status. Each push of the "SHIFT" key will change the status. With "SHIFT ON" all 26 letters of the alphabet can be entered (indicated in blue on the keypad). With "SHIFT OFF" the numeric key pad 1 thru 0 plus the period are enabled. The SPACE is effective in both modes.

2.4.12 User Message (cont.)

Enter the following message: ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890.@@ The "@" is obtained by pressing "TEXT" key (in the "SHIFT ON" mode).

Depress the "DELETE" key and note one "@" is erased.

Depress "ENTER" to enter the message into memory.

2.4.13 Status Check

Toggle the "PRINT" key several times and note the display indicates "ENABLE ANNOTATION" and "DISABLE ANNOTATION". Leave in "ENABLE ANNOTATION".

With the Chart Stopped, depress the "STATUS" button. The display will indicate, in succession, the status of the recorder as follows: "ANNOTATION ON; TIME ON; DATE ON; STOP ON; TEST# 84 ON; MESSAGE< ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890.@ MESSAGE ON; followed by STOP".

2.4.14 Amp Print Check

With no amplifiers installed, depress the "AMP PRINT" button.

The display should indicate "AMPS UNAVAILABLE".

2.4.15 Keyboard Lock

Run the chart at 5 mm/sec.

Toggle the "LOCK" button several times and note the display reads "KEYBOARD LOCKED" AND "KBD UNLOCKED". Leave in the "KEYBOARD LOCKED" mode.

Activate the left and right "MARK EVENT" buttons and verify the right event marker functions.

Depress every other key and button on the front panel except "LOCK" and "STOP". Note no action occurs. Verify also that the pen positions controls are locked.

Press "STOP" and verify recorder stops.

Press 5 mm/sec and verify recorder will not run and display will indicate "KEYBOARD LOCKED".

Depress "STOP" and unlock the keyboard by pressing "LOCK" again.

2.4.16 Divide by Checks

Set the recorder to "STOP".

Locate the DIP switch on the Controller Board and set the switches as follows:

SW positions 1,2 & 4 OFF
SW position 3 ON

Run the chart recorder at 100 mm/sec and toggle the "DIVIDE BY" button. Note that the display and the chart speed will toggle between 100 mm/sec and .100 mm/sec. This is divide by 1000.

Set SW position 3 to OFF and toggle the "DIVIDE BY" button. Note that the display and the chart speed remains at 100 mm/sec. This is divide by 1.

Set SW position 4 to ON and toggle the "DIVIDE BY" button. Note that the display and the chart speed will toggle between 100 mm/sec and 100 mm/min. This is divide by 60.

Set SW position 3 to ON and toggle the "DIVIDE BY" button. Note that the display and the chart speed will toggle between 100 mm/sec and 1.00 mm/sec. This is divide by 100.

Depress the "STOP" button.

2.4.17 Local/Remote

While in "STOP", toggle the "LOCAL/RMT" button and note the display reads "LOCAL" and "REMOTE". Leave in "REMOTE".

Depress 5 mm/sec and note the recorder will not run and the display will indicate "3000 IN REMOTE".

Depress the "LOCAL/RMT" button once and the display should read "LOCAL". Depress "STOP".

2.4.18 Chart Supply and Interlocks

Set the recorder to "STOP".

Open the chart table, remove paper and note the display reads "INTERLOCK".

Defeat both the table and the chart paper out interlocks by covering them over with paper. Note the display reads "STOP" when both are defeated.

Check that by uncovering EITHER interlock the message "INTERLOCK" will appear on the display. Re-defeat both interlocks.

With both interlocks defeated, ensure no paper is in the recorder and locate the 5 paper sensors on the left side plate.

2.4.18 Chart Supply and Interlocks (cont.)

Will all sensors uncovered, press the "CHART SPLY" button on the front panel. The display should read "SUPPLY = 25% - 0%".

Cover the bottom sensor and press the "CHART SPLY" button again. The display should read "SUPPLY = 50% - 25%". Repeat covering only the front top sensor. Same display should result.

Cover the bottom and the middle sensors and press the "CHART SPLY" button again. The display should read "SUPPLY = 100% - 50%". Repeat covering the two front sensors. Same display should result.

Cover all five sensors and press the "CHART SPLY" button again. The display should read "SUPPLY = 100% - 50%".

Uncover all interlock sensors, re-install paper and close the table.

2.4.19 Event Markers

Run the chart at 5 mm/sec and press the "LEFT EVENT" button. The right event marker should deflect to the left apx. 1-2 mm and remain deflected as long as the button is held.

Repeat with the "RIGHT EVENT" button and check for right deflection.

Enable the timer and set for 1 second. With the chart recorder running, check for 1 second event marks. The deflection will be left for 9 pulses and right every tenth pulse.

2.4.20 Chart Speed Accuracy

With the chart running at 500 mm/sec and the 1 second internal timer enabled, allow the chart to run for 3 to 4 meters of paper.

Using a meterstick, measure the distance between the leading edge of two 1 second pulses. This should be 1000 mm +/- 2.5 mm for an accuracy of 1/4%.

Change the speed to 5 mm/sec and run for at least 2 meters of paper. Measure the distance between 20 of the 10 second pulses. This should be 1000mm +/- 2.5 mm for an accuracy of 1/4%.

Stop the recorder.

2.4.21 Annotation Printing

Run the chart recorder at 25 mm/sec and enable the annotation by pressing the "PRINT" key until "ENABLE ANNOTATION" is displayed.

The annotation date is printed in left margin as follows: Time arrow, actual time, date, chart speed, test # and message. The sequence is repeated continuously.

Change the chart speed to 10 mm/sec and note the annotation resets and begins a new sequence with the arrow.

2.4.22 Self Test

Run the recorder at 10 mm/sec and DISABLE ANNOTATION. With no inputs to the recorder, set channel 1 position to 10 mm from the RIGHT chart edge. Center all other analog channels. Set the EVENT TIMER to "TIMER OFF".

Press the "SELF TEST" button. The following sequence should occur: The recorder will run at 25 mm/sec. All analog channels will deflect to the left electrical limit and ramp toward the right electrical limit. During this time the left annotation head will print a series of alpha characters and numbers and the timer will operate at .1 MIN intervals (apx 1 pulse every 16 mm). When the pens reach the right limits, channel 1 will deflect to the left and at the same time a "bar" will be printed by the annotation head. Then channel 1 will deflect to the right and all other analog channels will deflect to the left.

Examine the results and ensure that the printed "bar" is aligned with the channel 1 left deflection, that the right deflection of channel one and the left deflection of the remaining analog channels are on the same time line. Specifications for both are .005"

Check that all analog traces deflected into the Right and Left ELECTRICAL limits, which are 1 to 1.5 mm beyond the chart edges (see step 2.4.24).

Stop the recorder.

2.4.23 Chart Centering and Paper Tracking

With Roll paper installed, run the recorder about 6 feet at 100 mm/sec to align paper.

The chart paper should center on the table within +/- .050".

Run the chart at 500mm/sec for about 10 seconds and note pen tip location and wander. Use an event marker for reference.

Change speed to 5 mm/sec and run for about 20 seconds. Then change speed to 25 mm/sec and run for about 20 seconds.

Examine all three traces. The median tracking point of the event marker should be within +/- .025" of the event ladder. The TOTAL chart wander must not exceed +/- .025" over the entire run.

2.4.24 Limits

With the chart stopped, manually move each analog pen to the right and left MECHANICAL limits. The pen tip excursion should be 2.0 to 2.5 mm beyond the chart edge. Exception is channel 1 left edge which should be at least 1 mm beyond edge.

With no inputs to the analog channels, run the recorder and center all the analog channels.

Apply a 1 hz triangle wave to each drive amplifier mini-jack input. Adjust the amplitude to drive the pen into the electrical limits. (About 6V P/P).

Observe the chart traces and ensure that the pen excursion is 1 to 1.5mm beyond the chart edges.

2.4.25 Frequency Response

With the chart running at 25 mm/sec, change the input to sine wave at 1 hz. Adjust the input amplitude for full scale output on one of the channels. Increase the frequency as per table below and check for outputs as indicated:

40 mm channels	--	DC to 60 hz +/- 1 division
50 mm channels	--	DC to 50 hz +/- 1 division
100mm channels	--	DC to 30 hz +/- 1 division

For 100mm channels only, reset input frequency to 1 hz and input amplitude to display 50mm (1/2 scale) P/P. Increase frequency to 50 hz and check for 50mm +/- 1 division.

Reset input frequency to 1 hz and input amplitude for 10 divisions P/P on the chart. Increase frequency as per table below and check for outputs as listed:

40 mm channels (10 div)	--	DC to 140 hz +/- 1 division
40 mm channels (10 div)	--	-3db down max at 160 hz (7 div or more)
50 mm channels (10 div)	--	DC to 125 hz +/- 1 division
50 mm channels (10 div)	--	-3db down max at 140 hz. (7 div or more)
100mm channels (10 div)	--	DC to 125 hz +/- 1 division
100mm channels (10 div)	--	-3db down max at 140 hz. (7 div or more)

2.4.26 Overshoot

Run recorder at 25 mm/sec and apply a 1 hz square wave to the inputs. Set amplitude for 90% FS.

Check for less than 1% overshoot F.S.

Change input amplitude to 20% of full scale.

Check for less than 1% overshoot F.S.

2.4.27 Amplitude Accuracy and Linearity

Connect a 0-10V dc source to each Drive amplifier input. Set the voltage to 0V.

With the chart running, center each analog pen.

Apply +2.500V DC to the inputs. The pens should deflect left full scale +/- .2% FS.

Apply +2.500V DC to -2.500V DC in steps of .500V.

Left chart edge accuracy is .2% FS. All other points must be within .35% FS.

2.4.28 Channel Reverse

Set input to Channel 1 to 0V DC.

Run the chart at 5 mm/sec and center the pen with the pen position buttons.

Depress "REV POL".

Message "CHANNEL NO. =" will appear in display.

Depress "1" pushbutton. Note the pen position may shift up to 20% from chart center. Re-zero the pen to chart center as needed.

Apply +2.500V DC to the channel 1 input.

The pen should deflect to the right full scale within .35% F.S.

Change input to 0V DC. Reverse channel one again to return channel 1 to Normal polarity.

2.4.29 Servo Amplifier Options

Set switches on the servo amplifiers as follows:

(RIGHT = OFF and LEFT = ON)

SW position 2 ON
SW positions 1, 3, 4, 5 & 6 OFF
(set up for 2V F.S.)

With 0V DC applied to inputs, center the pens.

Apply + and - 1.000V DC to the inputs. The pens should deflect FS Left within .2% and FS Right within .35%.

Set inputs to 0V and reset servo switches to:

SW position 4 ON
SW positions 1, 2, 3, 5 & 6 OFF
(set up for 10V F.S.)

2.4.29 Servo Amplifier Options (cont.)

Center the pens if necessary and apply + and - 5.000V DC to the inputs. The pens should deflect FS Left within .2% and FS Right within .35%.

Apply OV DC to the inputs and reset servo switches to:

SW positions 1 & 3 ON
SW positions 2, 4, 5 & 6 OFF
(set up for 5V F.S. and reverse monitor output)

Connect a DVM to the Output Monitor BNC jack on the servo board on channel 1.

Center the pen as needed and note the output as read on the DVM. The output should be OV +/- 1V.

Move the pen to the left and note the voltage becomes more negative. Move the pen to the right and note the voltage becomes more positive.

Recenter the pen and adjust position for 0.0V as read on the DVM. (Pen may NOT be at chart center).

Apply +2.000V to the input. The pen will deflect to the left 20 divisions from referenced zero and the output as read on the DVM will be MINUS 2V (apx).

Set Switch S1 to OFF (Normal polarity) and note the pen is still deflected to the left but the DVM now read +2V (apx).

Repeat above procedure for all channels.

2.4.30 Remote Inputs

Remove all input connections from the servo pin jacks.

For all connections below, the common is either pin 29 or pin 30 of the remote connector on the master controller board. Remote input connector - Gould Part No. 244550-37, supplied with recorder

Connect a frequency counter to the remote connector pin 27.

Run the recorder at 100 mm/sec and observe the output frequency of 8 khz +/- .25% (+/- 20 hz).

Set the recorder to Stop. Remove the connection from pin 27. Connect a Zero-based square wave of +3.5V peak to pin 28.

Set the frequency to 1 khz and set the recorder to EXT. Turn the timer on at 1 second rate. Note the chart recorder runs at about 12.5 mm/sec.

Ramp the input frequency to 8.000 Khz. Measure the accuracy of the chart speed. It should be 100 mm/sec +/- .25% (+/- 2.5mm).

2.4.30 Remote Inputs (cont.)

Ramp the input frequency to 40.000 Khz. Measure the accuracy of the chart speed. It should be 500 mm/sec +/- .25% (+/- 2.5mm).

Set the recorder to "STOP" and remove the connection from pin 28.

Make closure connections to pins 1,2,22,23,24,25 and 26. These will be closed to ground (low true) in the following remote chart speed tests. Pin 1 operates on edge triggering while the remaining pins can be held in one state.

Set the recorder to STOP. Make the following tests and observe results on the display and by the chart motion.

An O in the column indicates open pins
An X in the column indicates shorted pins
A P in the column indicates to pulse low and return to open

1	2	S0 22	S1 23	S2 24	D0 25	D1 26	Results
O	O	O	O	O	O	O	RECORDER STOPPED
X	O	O	O	O	O	O	RECORDER IN EXTERNAL
X	P	O	O	O	O	O	RECORDER STOPPED
X	O	X	O	O	O	O	CHART SPEED OF 5 MM/SEC
X	O	O	X	O	O	O	CHART SPEED OF 10 MM/SEC
X	O	O	O	X	O	O	CHART SPEED OF 50 MM/SEC
X	O	O	O	X	X	O	CHART SPEED OF .050 MM/SEC
X	O	O	O	X	O	X	CHART SPEED OF 50 MM/MIN
X	O	O	O	X	X	X	CHART SPEED OF .50 MM/SEC
X	O	O	O	X	O	O	CHART SPEED OF 50 MM/SEC
X	P	O	O	X	O	O	CHART STOPPED
O	O	O	O	X	O	O	CHART STOPPED
O	O	X	X	X	O	O	CHART STOPPED
P	O	X	X	X	O	O	CHART SPEED OF 500 MM/SEC
O	P	X	X	X	O	O	CHART STOPPED

Remove connections from the remote connector.

With no connections to channel 1, position the pen to the RIGHT chart edge. Connect pin 19 of the remote connector to channel 1 analog input. Set the TIMER to "TIMER OFF".

With the chart running, there should be no timer pulses on channel one or the event pen.

Turn the TIMER ON and set for 1 SECOND. Note that the timer pulses appear on the event pen AND on channel 1 analog pen. The amplitude on channel 1 should be 4-5V NEGATIVE pulses and will pulse ONLY in the NEGATIVE direction. The event pen traces should be normal, 9 pulses to the left and one pulse to the right.

Stop the recorder and remove the pin 19 connection and the analog channel connection.

2.4.30 Remote Inputs (cont.)

Connect pin 20 of the remote connector to ground. Run the recorder and note the event pen pulses at 1 second intervals, 9 pulses to the left and 1 pulse to the right.

Short pin 21 of the remote connector to ground. The event pen should deflect LEFT as long as pin 21 is grounded, overriding the timer.

Remove the connections from pins 20 and 21.

With the recorder running, short remote pin 3 to ground. The standard right hand event marker should deflect to the left.

Open pin 3 and short remote pin 4 to ground. The standard right hand event marker should deflect to the right.

Open pin 4 of the remote conenctor.

For optional event markers, shorting the indicated remote pin to ground will deflect the marker to the left or right as stated:

OPTIONAL EVENT MARKER	PIN #	DEFLECTION
1	5	LEFT
1	6	RIGHT
2	7	LEFT
2	8	RIGHT
3	9	LEFT
3	10	RIGHT
4	11	LEFT
4	12	RIGHT
5	13	LEFT
5	14	RIGHT
6	15	LEFT
6	16	RIGHT
7	17	LEFT
7	18	RIGHT

Stop the recorder and connect a DVM to remote pin 32 and ground. With the recorder at "STOP", the DVM should read apx 5V DC.

Pull the writing table slightly ajar until the "INTERLOCK" message appears on the display. At this time the DVM should read apx OV DC.

Remove the DVM.

2.4.31 Interface Input Connections/Writing Quality

Install the dummy interface input card. Remove any connections from the drive amplifier phone jacks.

Signal input connector - Gould Part No. 245537-37, supplied with recorder. Make input analog signal connections to pins 20 thru 27 inc. on the 37 pin interface input connector. Pin 20 is channel 1 thru pin 27 which is channel 8. Commons are pins 1 thru 11 on the same board.

Connect a function generator to the inputs and run the chart at 25 mm/sec. Set the generator for about 25 Hz F.S. sine wave and note that a signal passes to all channels.

Reduce frequency to 1 Hz and change to a triangle wave. Run the chart at about 5 mm/sec.

Check writing quality:

Traces should be dry about 1/2 way down the chart table.

2.4.32 Multiple Power Supply

Remove power from the recorder and test ONE supply at a time as follows:

Install only one 15V P.S. and apply power to the recorder. Run chart at 100mm/sec and apply a F.S. sine wave to all channels. Slowly increase frequency to 20 Hz. The recorder should have enough power to drive all channels at least 15-20 Hz F.S. with only one power supply.

Stop recorder and test each supply independently.

Re-install all power supplies and check unit at maximum frequency response to ensure all supplies function in parallel.

2.4.33 Final Set Up

Set recorder to "STOP". Ensure clock and date are set correctly. Set switches on master controller board as follows:

SW position 1 OFF = WARM START (ON = Toward PC Board)
SW position 2 OFF = REAL TIME CLOCK
SW positions 3 & 4 ON = DIVIDE BY 100.

Set switches on the SERVO board as follows:

SW position 3 ON
SW positions 1,2,4,5 & 6 OFF
This is 5V F.S. span and normal polarity of monitor output.

Remove all analog inputs and position all pens to chart center. Then "STOP" recorder and remove power.

2.4 PERFORMANCE TEST PROCEDURE

2.4.33 Final Set Up (cont.)

Wait about 2 minutes and reapply power. Verify that the time and date are still functioning. Run recorder and verify all pens are still at chart center.

STOP recorder and remove power.

If recorder has interchannel annotation heads, they should be tested using either an RS 232 or IEEE interface and addressing them directly or connecting appropriate amplifiers and checking thru the AMP PRINT mode.

2.5 MECHANICAL ADJUSTMENTS

2.5.1 Annotation Head Alignment

After replacement of the annotation head, initial adjustment prior to applying power is important to prevent damage to the head due to poor thermal contact with the paper.

The left/right location for the left edge annotation head may have to vary slightly from an initial setting due to paper tracking tolerances, especially for the 8 Ch unit where the writing area available is smaller than on the 6 Ch unit. In any case, the .120 inch characters are supposed to be written .030 inch from the left paper edge to the closest printing dot. Figure 4-9, Transport Assembly, on page 4.17 shows an exploded view of the left edge annotation assembly. To adjust left/right position of the annotation arm loosen multiple spline screw, item-5 in Fig. 4-9. Position annotation arm accordingly then tighten multiple spline screw.

Initial adjustment -- 8 Ch .... 0.120"	Measure Table edge to
Initial adjustment -- 6 Ch .... 0.170"	arm body

Annotation Head Pressure against chart is 100 grams +/- 5 grams. Measure with table closed and power off. Using a 0-150 gram gauge, lift tip without damaging writing element. Measure at 90 degree angle to the arm. The spring, item-8 in Fig. 4-9, has +/- 10 gram (step) adjustment on the end which is attached to the annotation mounting bracket, item-10 Fig. 4-9.

A one time adjustment of the annotation heat sink, item-11 Fig. 4-9, so that the writing element is parallel to the surface of the rubber roller on which it writes is required and is accomplished by twisting the square heat sink bar until the element remains parallel to the roller. Avoid damaging the writing element and flexible printed circuit cable on the under side. Adjust, by torquing the 1/4 inch square heat sink bar, item-11 Fig.4-9, so that the writing element on the annotation arm is parallel to the rubber roller on the writing table. Improper adjustment will show up as light writing at top or bottom edge of printed letters and eventual damage of the writing element from overheating. Screws, item-13 Fig. 4-9, must be tight during this adjustment.

2.5 MECHANICAL ADJUSTMENTS

2.5.2 Vertical Alignment Left Edge Annotation Head

The head is to be adjusted so that the writing element is centered on the crown (high point) of the rubber roller with respect to a plane parallel to the annotation arm. Use alignment gauge Gould Part No. CL-211327 to adjust up/down position of the annotation arm. Calibration instructions are given below for both Left Hand and optional interchannel heads.

Loosen the two screws, items-13 Fig. 4-9, which hold the heat-sink to the arm just enough to allow the heat-sink to slide up and down when the adjusting screw is rotated, item-7 Fig. 4-9. Do not loosen these screws to the point where separation between the parts could occur.

Raise the arm off the rubber covered roller, and interpose a .008"-.010" thick gauge block (about .35"wide x 1.125"long, feeler gauge) Gould Part No. CL-211327, between the head and the roller. The gauge block should be positioned to extend about .6" back beyond the cylindrically contoured ridge of the print head.

Rotate the alignment screw, item-7 Fig.4-9, top of the assembly to find the position where the gauge tool (CL-211327) is visually parallel to the bottom surface of the print-head.

From the screw orientation that yielded the above parallelism, rotate the alignment screw 1/6 turn in the direction which increases the separation between the print head wafer and the gauge block.

Remove the gauge block, and tighten the down the attachment screws, items-13 Fig. 4-9. Recheck element parallism.

2.5.3 Interchannel Annotation Head Alignment

The procedure for aligning interchannel annotation heads is the same as the procedure for aligning the the edge annotation head except that the interchannel annotation heads write on the top of the table roller instead of the front.

2.6 ELECTRICAL CALIBRATION

2.6.1 Chart Drive Board

This paragraph calibrates the Zero Offset and Gain adjustments for the paper speed VCO (Voltage Control Oscillator). Attach averaging frequency counter at TP2 (high probe) and TP6 (common).

Press 500 mm/sec and DIVIDE BY buttons.

Adjust R43 for 80,000 +/- 80 Hz.

Press 5 mm/sec button and adjust R27 for a frequency of 800 Hz +/- 0.8 Hz.

Repeat both adjustments until interaction of circuitry has been negated. Adjusting at 500 mm/sec first gives the least interaction.

2.6 ELECTRICAL CALIBRATION

2.6.1 Chart Drive Board (cont.)

Disconnect frequency counter and program event timer repetition rate for 1 second intervals. To select timing rate press the SET key, then repeatedly press the EVENT TIMER key until display reads 1 second, then press the ENTER key.

Press the 25mm/sec button, divide by function inactive. Run at least 1 meter of chart paper out the bottom of writing table.

Press front panel STOP button.

Remove chart paper and lay paper on flat surface.

With a meter stick measure the event pulses. There should be 41 pulses, counting the first and last pulse, over one meter of chart paper $\pm$2.5 mm. If a meter stick is not available the 1 mm and 1 cm grid lines printed on the chart paper may be used.

If the number of pulses over one meter of chart paper does not equal 41 than the base frequencies of 800 and 80K Hz must be changed to compensate for variation in the mechanical tolerances. If the chart is 10% fast reduce both frequencies by 10% and repeat measurement of pulses.

2.6.2 Pen Servo Board (Repeat this section for each pen)

2.6.2.1 Preset Initial Conditions (new boards only)

-- SPAN, DAMP, FREQ COMP, HEAT BAL and R-6 (SQ WAVE COMP) centered.
-- RIGHT LIMIT and LEFT LIMIT at full CCW. (25 turn controls)
-- Dip switches - # 3 "ON" (toward PC board); 1,2,4,5, and 6 "OFF".
(Monitor Polarity normal, +/- 2.5 v sensitivity)

2.6.2.2 Square Wave Comp. R-6

Prepare to calibrate R-6.
-- Insert Extender Board CL-210472 in card slot.
-- Insert Servo board in Extender.
-- Power ON, (COLD START) Provides zero penposition offset.
-- Chart speed at 5 mm/sec or slower.
-- Input signal at zero.

Adjust R-6's to center pens on channel centers. (+/- 1 div is adequate)

NOTE:

For the remaining adjustments on the servo board the Extender Board should not be used.

2.6.2 Pen Servo Board (cont.)

2.6.2.3 Span Adjust

Use pen position push button controls to exactly center the pen.

Apply +1.000 vdc to channel input via Analog Signal Input connector Gould Part No. 245537-37 or mini phone plug Gould Part No. 290144 (both supplied with recorder). Analog Input connector pin connection information is in Section II of the 3000 User's manual.

Adjust SPAN control for 10 divisions left deflection.

Recheck pen zero at chart center with zero volts applied then increase input to +2.500 vdc and fine adjust SPAN control for full scale left deflection. Adjust for +/- .2% of F.S. accuracy.

Apply + 2.500 vdc through - 2.500 vdc in steps of .500 vdc. Repeat and readjust span and zero ... Linearity must be within .35 % at all points with left deflection within 0.2%

Repeat span adjust for all channels.

2.6.2.4 Damping Adjust

Center pen using appropriate buttons and apply $\pm$ 2.0 volt, 10Hz square wave to each channel and adjust DAMPing for 1/2 div overshoot at 25 mm/sec.

2.6.2.5 Frequency Compensation Adjust

Set FREQ COMP at 25 mm/sec by sweeping from 10 Hz (full scale sine wave input) to the upper frequency limit of recorder (60 Hz RS3800 or 50 Hz RS3600) on each channel. Adjust for less than +/- 1 div variation. Recheck damping at 80% F.S. square wave and reset FREQ COMP if necessary.

Reduce input amplitude to 10 mm and check 100 Hz sine wave response to be flat within 0.5 div. Check 125 Hz +/- 1 div response.

2.6.2.6 Limit Adjusts

Set LEFT and RIGHT electrical LIMITS using +2.7 VDC and -2.7 VDC. Adjust for 1 to 1.5 div deflection beyond channel limits -- except for L.H. 40 mm channel where the left deflection should be set at 1 mm outside the channel.

Adjust the mechanical limits for 2 to 2.5 mm overtravel on the channel extremes (Power OFF). Adjust the mechanical stops with the power off as follows:

Swing the pen to the left, loosen the right hand screw which clamps the left stop. Position the pen tip 2 to 2.5 mm outside the channel and move the stop to the pen hub and tighten the clamp screw. Similarly, repeat the operations for the right limit, using the left screw to loosen the R.H. stop. On the 80/100 mm penmotors the clamping screws are accessible without swinging the pen out of the way. Same 2.0 to 2.5 div overtravel.

NOTE:

Exceeding the penmotor limits or mis-setting the electrical or mechanical limits with the power on may result in one or more circuit breakers on the servo board opening. Breakers can be reset after removing the overload (center the pens).

SECTION III

MAINTENANCE

3.1 INTRODUCTION

This section contains subassembly replacement and troubleshooting instructions for the Gould RS 3600 and RS 3800 ink recorders. For replacement information on materials regularly consumed in operation refer to the maintenance section in the 3000 User's manual.

3.2 SUBASSEMBLY REPLACEMENT

WARNING:

MAKE SURE POWER SWITCH IS TURN OFF AND RECORDER IS DISCONNECTED FROM POWER SOURCE BEFORE DISASSEMBLY.

3.2.1 Carrying Case

Refer to Figure 4-6 in the illustrated parts breakdown section of this manual.

The top and the side covers of the carrying case are removable allowing access to certain areas on the recorder. The top of the carrying case is held on by either (4) screws, item-2 or by (4) clip springs located approximately in the same area as the screws are shown. To remove top cover held on by clip springs, grasp "U" shaped cover, item-1, near the top middle of both sides with the palms of your hands. While applying enough inward pressure to prevent hands from slipping, lift top cover straight up. Remove the side cover, located below the handle, by unscrewing the (3) screws, item-15, and sliding cover, item-14, down. Suggested method for removing side cover is to position recorder on work bench so that the side which is to be removed extends beyond the table top allowing access to screws.

To remove the recorder from its carrying case remove the (4) front panel screws, (8) bottom screws and (1) rear screw which secure recorder into carrying case. Recorder slides out the front of the carrying case as depicted in Figure 4-1.

3.2.2 Separating Card Cage From Transport

Refer to Figure 4-7 in the illustrated parts breakdown section of this manual.

Remove recorder from carrying case in portable systems or saddle in rack mounted systems. Remove the (3) screws, item-10, from each side. Unplug the flat cable which comes from the front panel board and connects to the tops of the mother-in-law and the mother boards. Unplug the stepper motor connector from the bottom of the mother board. Separate the card cage from the transport far enough to allow access to the penmotor connectors. Unplug the penmotor cables, item-8, from the penmotors and the cable, item-11, which is connected to the bottoms of the mother and the mother-in-law boards.

3.2 SUBASSEMBLY REPLACEMENT (cont.)

3.2.3 PC Board Replacement

Most of the electronic circuitry is contained on the PC boards plugged into the card cage. To remove any one of the PC boards the rear panel must be removed. The recorder does not have to be removed from its carrying case but the top cover must be removed so that the (4) screws on the top of the rear cover can be removed. Also remove the (4) screws on the back of the rear panel. Refer to Figure 4-16 for rear panel removal illustration and PC board orientation.

The paper out sensor board, speed monitor board, mother-in-law board, chart supply board, keyboard and optional interchannel annotation driver board are all PC boards which perform functions remote to the card cage.

The paper out sensor board is mounted below penmotor Ch. 1 inside the chart supply compartment; refer to Figure 4-9 item 28. To remove paper out sensor board remove screw, item 29, and unplug board from cable connector.

The speed monitor board is also depicted in Figure 4-9, item-42. To remove speed monitor board unscrew item-43 while holding nut, item-44 with a wrench.

The chart supply sensor board is illustrated in figure 4-11 item 5. Item-3 the guide assembly must be removed before chart supply board is removed.

The mother-in-law board is attached to the pen bar assembly and requires the separation of the card cage from the transport before mounted screws, depicted in Figure 4-12 item-4, can be removed.

To remove the keyboard PC board from the control panel assembly, Figure 4-15, unscrew the (10) screws item-3 which holds assembly together. Unplug flat cable from connectors on top of the mother-in-law board and the mother board.

NOTE:

The flat cable is attached to the keyboard PC board and does not unplug.

The optional interchannel annotation driver board is located below the ink plunger and cartridge assemblies on the top side of the pen bar above the transport. The driver board plugs into the bottom row of connectors on the mother-in-law board. Before removing driver board unplug annotation heads which plug into socket on driver board.

To remove the mother board separate the card cage from the transport. Remove the (8) screws which retain the mother board support assembly to card cage, refer to Figure 4-17 items-2 and -15. After support assembly has been removed the mother board can be separated from the support bars by removing the (14) screws which attach mother board, spacer and shield to support bars. During installation of mother board do not completely tighten screws, item 6, until support assembly has been installed into card cage; at that point align connectors on the mother board with PC card guides and tighten screws, item-6.

3.2 SUBASSEMBLY REPLACEMENT (cont.)

3.2.4 Writing Table

Refer to Figure 4-13 in the illustrated parts breakdown section of this manual.

To remove writing table assembly, fully open writing table. Grasp the pull bar, item-13, in your left hand. Flex the right support link, item-3, far enough away from writing table to allow the pivot screw cap, item-9, to slip out of hole in support link. The writing table should now fall out of the recorder.

3.2.5 Front Panel

Refer to Figure 4-7 in the illustrated parts breakdown section of this manual.

To remove front panel assembly remove carrying case cover in portable systems or extend recorder on its slide in rack mounted systems. Unplug the flat cable which is connected to the front panel, from connectors on the top of the mother-in-law and the mother boards. Detach latch, item-2, by removing the screw, item-3, which attaches latch to front panel. Remove the pivot screws, item-6, from each side and feed flat cable through notch in panel bezel assembly, item-12, while pulling front panel assembly away from recorder.

3.2.6 Manifold Assembly

Refer to Figure 4-12 in the illustrated parts breakdown section of this manual.

Remove carrying case cover in portable systems or extend recorder on its slides in rack mounted systems. Turn OFF ink plunger, item-6, by rotating the activating screw CW until spring inside of plunger is fully compressed. Disconnect item-1 from the solenoid mounted on the manifold assembly, red and black twisted wires. Remove all ink tubing from the manifold by loosening the brass screws in the tube clamps with a flat blade jewelers screwdriver and pulling ink tubing from all stems on manifold. Remove (2) screws, item-26, which hold manifold to pen bar. When replacing ink tubes make sure outer area of manifold stems are clean and dry.

3.2.7 Penmotor

Refer to Figure 4-12 in the illustrated parts breakdown section of this manual.

Each penmotor is held in place by (2) screws, item-23 which retain penmotor from the top. To gain access to the penmotor screws the ink manifold, item-25, may have to be moved out of the way. Ink tubes do not have to be removed from manifold in order to move manifold, but ink pen tube which is attached to penmotor being replaced must be removed. Turn ink value OFF before removing ink pen (ink valve is located above manifold stem to which ink tube is connected) by rotating value CCW until mechanical stop is reached. Remove (2) screws, item-26, which hold manifold to pen bar. Gently move manifold out of the way and remove penmotor screws, item-26, while holding onto penmotor with free hand. Unplug penmotor cable and remove penmotor.

3.3 TROUBLESHOOTING

3.3.1 Introduction

This section provides troubleshooting hints to assist the service person in locating possible malfunction and their remedy.

3.3.2 Electrical Power

MALFUNCTION	POSSIBLE CAUSE	REMEDY
1. Recorder inoperative (Display blank and fan not running)	a. Recorder not connected to power source.	a. Connect to power source.
	b. Main fuse blown.	b. Replace fuse.
2. Recorder inoperative (Display blank, fan running)	a. 5900 card cage	a. Card cage not connected to power source, not switched on or power supply in card cage defective.

3.3.3 Chart Drive Malfunction

MALFUNCTION	POSSIBLE CAUSE	REMEDY
1. Display reads 'INTERLOCK'	a. Paper loaded wrong or supply roll empty.	a. Check supply roll, refer to User's manual for proper loading.
	b. Open table sensor item-16 Fig.4-9 misaligned.	b. Reposition sensor so that its focal point is the closed writing table thru hole in side plate.
	c. Paper out sensor bd. item-28 Fig. 4-9 malfunctioning or out of focus.	c. Loosen mounting screw item-29 and position bd. so sensor is located above paper travel.
2. Display reads 'STOP MOTOR STALLED'	a. Speed monitor bd. item-42 Fig. 4-9 malfunction or timing disk item-41 Fig. 4-9 not traveling thru 'U' shaped sensor on speed monitor board.	a. Reposition speed monitor bd. bend mounting bracket if side plate is equipped with bracket (metal side plates do not have bracket)

3.3.3 Chart Drive Malfunction (cont.)

MALFUNCTION	POSSIBLE CAUSE	REMEDY
2. Display reads 'STOP MOTOR STALLED'	b. Drive belt broken.	b. Replace belt.
	c. Fuse on chart drive bd. blown.	c. Replace fuse.
	d. Stepper motor shaft turning but pulley is not.	d. Tighten set screw in pulley.
	e. Timing disk came off metal disk.	e. Glue timing disk back on to medal disk.
	f. Chart take-up drive gear not meshing properly.	f. Remove side cover on drive arm and adjust eccentric cam to lessen pressure.

3.3.4 Signal Malfunction

MALFUNCTION	POSSIBLE CAUSE	REMEDY
1. Trace unusually wide.	a. Noise appearing on pen tip.	a. Check input signal and cable connections. Determine if fault is on servo bd. or within penmotor by exchanging servo bds. and penmotor cables; repair or replace (unplug cables item-8 Fig. 4-7, at the penmotor).
2. No signal	a. Defective Servo bd. or penmotor.	a. Follow same remedy as Trace Unusually Wide.
	b. Signal conditioner defective.	b. Repair or replace.
	c. Interface cable between recorder and 5900 unplugged or defective.	c. Plug in, repair or or replace interface cable, item-4 fig. 4-3.

3.3.4 Signal Malfunction (cont.)

MALFUNCTION	POSSIBLE CAUSE	REMEDY
3. Pens limp or biased	a. Servo out of calibration.	a. Calibrate servo bd.
	b. Defective servo bd. or signal conditioner.	b. Repair or replace.
	c. Loose pen.	c. Align and tighten pen.
	d. Loose penmotor band.	d. Tighten band tension 7.0 to 8.0 pounds using spring scale.

3.3.5 Inking System Malfunction

Refer to the 3000 User's manual maintenance section.

SECTION IV

PARTS IDENTIFICATION

4.1 INTRODUCTION

The following parts lists and schematic diagrams in Appendix A are included to assist in service and repair of the RS 3600 and RS 3800 ink recorders. For replacement parts locate component in the appropriate figure, then refer to the Parts List which is pertinent to that figure.

To assure prompt and satisfactory delivery of replacement parts, include the following information with your purchase order:

1. Name, model number, and serial number of the recorder.

   Example: RS 3800

   Model: 30-V7808-10
   Serial No: xxx

2. Description of the part as listed in manual.

3. Gould part number.

NOTE:

Do not use the symbol number from the parts list or the schematic to identify the desired parts on your order.

4.2 ATTACHING PARTS (A-P)

Attaching hardware is designated by an (A-P) after the line item it attaches to and continues until the line shown as -------- * --------. Unillustrated hardware is listed as an Attaching Part.

4.3 ASTERISK

Part numbers preceded by an asterisk * are not procurable.

4.4 USED ON CODE

The USED ON column identifies the recorder assembly for which that part is unique. If an on code letter is not present, that part is common to both RS 3600 and RS 3800. The used on codes are listed below.

LETTER CODE	RECORDER ASSEMBLY
A	RS 3800
B	RS 3600

4.5 COMPONENT ORIENTATION

The corner mark placed inside some electronic components on PC board breakdowns indicates one of the following conditions to be true:

(1) cathode end of diode
(2) positive polarity of capacitor
(3) pin 1 of I.C.

RECORDER PORTABLE CARRYING CASE, 30-V7808-10
FIGURE 4-1

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	30-V7808-10	Recording System, 8 Ch. Ink, Portable	A
	30-V7606-10	Recording System, 6 Ch. Ink, Portable	B
1	30-V7808-00	Recorder, Ink, 8 Channel (See Fig. 4-7)	A
1	30-V7606-00	Recorder, Ink, 6 Channel (See Fig. 4-7)	B
2	CL-811054	Enclosure Assy., Portable (See Fig. 4-6)	
3	CL-210430-0218	Screw, Panel, Pan Hd., 10-32 x 1-1/8 In. w/Nylon Washer (A-P)	
	13-262716-8206	Screw, Pan Hd., 8-32 x 3/8 In. (Not Shown)	

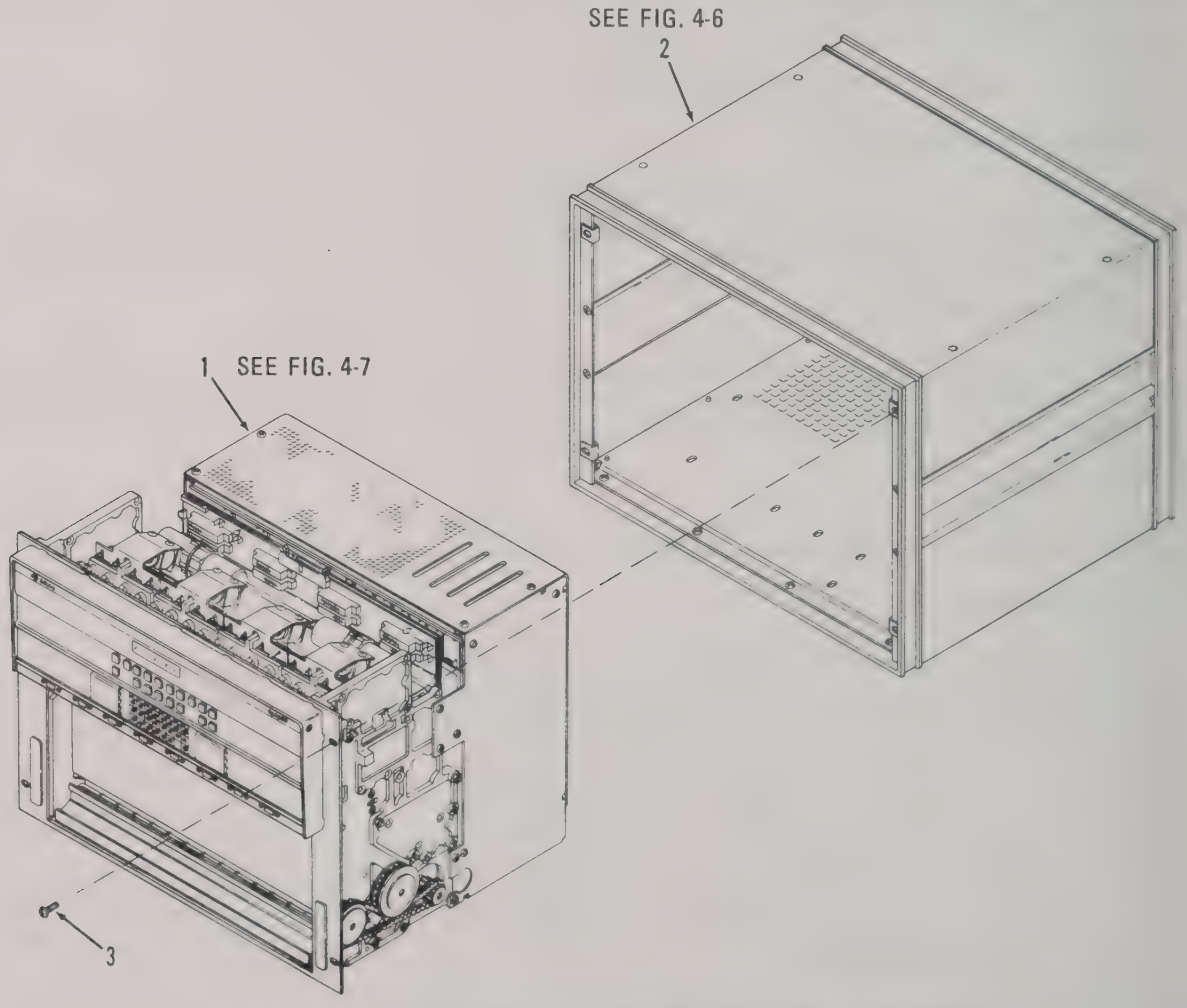


FIGURE 4-1 PORTABLE RS3800 SERIES RECORDER

RS3800 & 3600 INK RECORDER
RS3800 AND 5900 PORTABLE, 30-V7808-12
FIGURE 4-3

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	30-V7808-12	Recording System, 8 Ch. Ink, Portable	A
	30-V7606-12	Recording System, 6 Ch. Ink, Portable	B
1	CL-810232	Frame Assy., 5900 Signal Conditioner, Non-Isolated (See Gould Manual P/N M11-4183-03)	
1	CL-810231	5900 Signal Conditioner Frame with Fans	
2	11-4221-06	Kit, Interface Board (See Gould Manual P/N M11-4183-03)	
3	13-262716-6206	Screw, Self-Tapping, Pan Hd., 6-32 x 3/8 In.	
4	CL-311222-1	Cable Assy., Interface (See Gould Manual P/N M11-4183-03)	
5	CL-811254	5900 Enclosure Assy., Portable (See Gould Manual P/N M11-4183-03)	
6	CL-210430-0218	Screw, Panel, Pan Hd., 10-32 x 1-1/8 In. w/Nylon Washer	
7	CL-811054	Enclosure Assy., Portable (See Fig. 4-6)	
8	CL-210430-0218	Screw, Panel, Pan Hd., 10-32 x 1-1/8 In. w/ Nylon Washer	
9	30-V7808-00	Recorder, Ink, 8 Channel (See Fig. 4-7)	A
9	30-V7606-00	Recorder, Ink, 6 Channel (See Fig. 4-7)	B

RS3800 & 3600 INK RECORDER
RECORDER RACK MOUNT, 30-V7808-11
FIGURE 4-2

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	30-V7808-11	Recording System, 8 Ch. Ink, Rack Mount	A
	30-V7606-11	Recording System, 6 Ch. Ink, Rack Mount	B
1	30-V7808-00	Recorder, Ink, 8 Channel (See Fig. 4-7)	A
1	30-V7606-00	Recorder, Ink, 6 Channel (See Fig. 4-7)	B
2	11-1202-38	Kit Assy., Rack Mount (See Fig. 4-5)	
3	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	

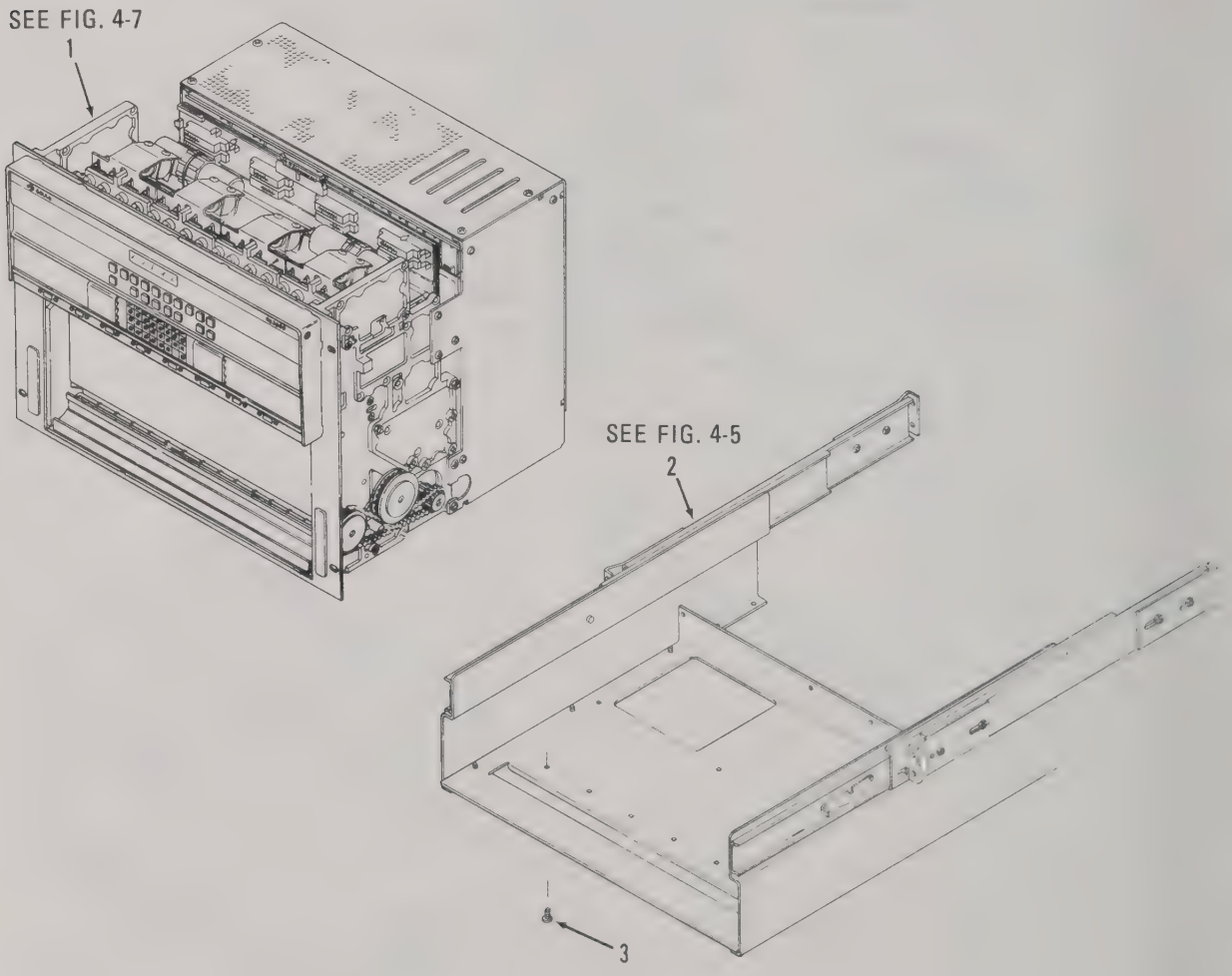


FIGURE 4-2 RACK MOUNTED RS3800 SERIES RECORDER

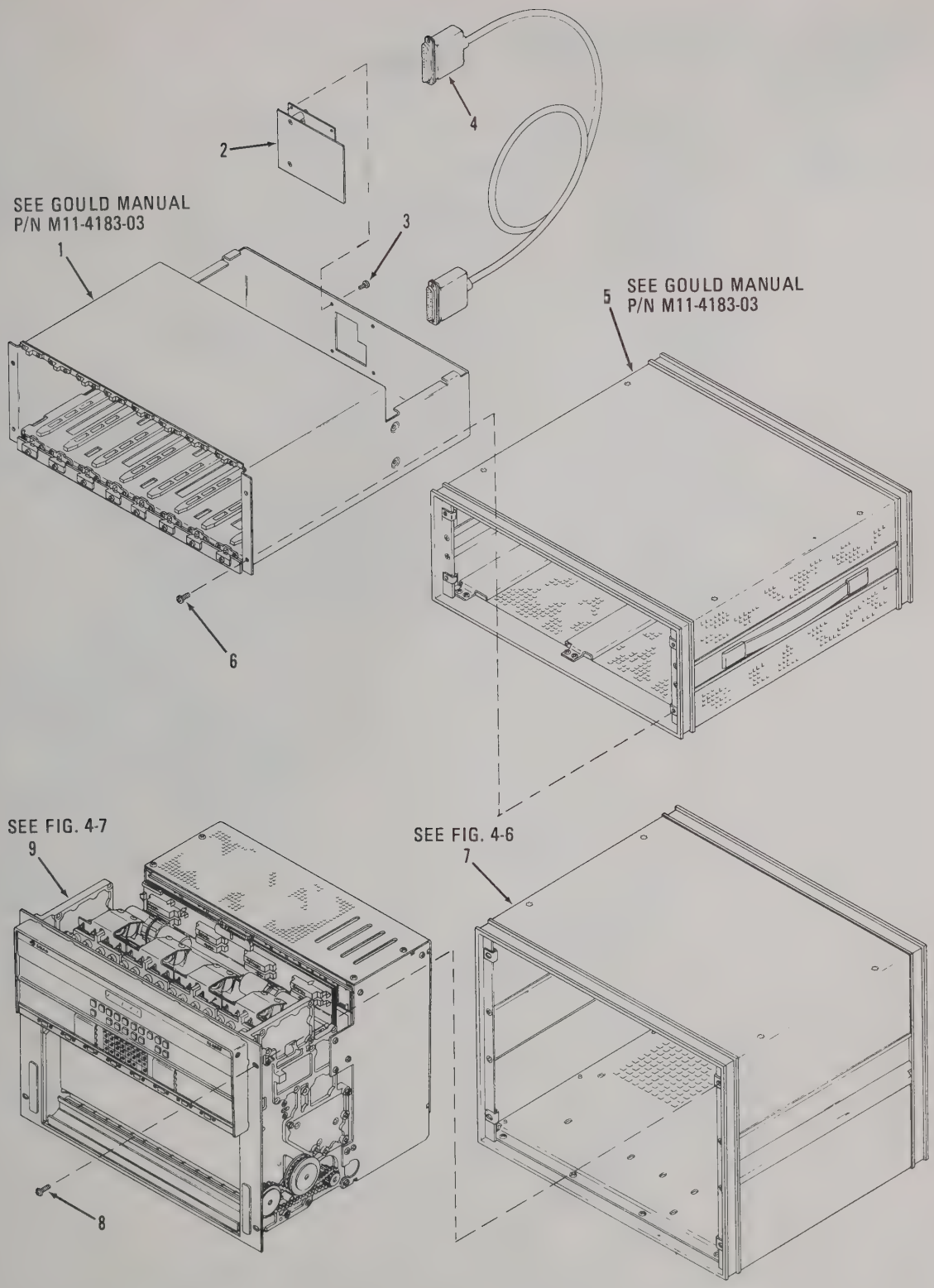


FIGURE 4-3 PORTABLE RS3800 SERIES RECORDER WITH SIGNAL CONDITIONER FRAME

RS3800 & 3600 INK RECORDER
RS3800 AND 5900 RACK MOUNT, 30-V7808-13
FIGURE 4-4

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	30-V7808-13	Recording System, 8 Ch. Ink, Rack Mount	A
	30-V7606-13	Recording System, 6 Ch. Ink, Rack Mount	B
1	CL-810232	Frame Assy., 5900 Signal Conditioner, Non-Isolated (See Gould Manual P/N M11-4781-01)	
1	CL-810231	5900 Signal Conditioner Frame with Fans	
2	11-4221-06	Kit, Interface Board (See Gould Manual P/N M11-4781-01)	
3	13-262716-6206	Screw, Self-Tapping, Pan Hd., 6-32 x 3/8 In.	
4	CL-311222-1	Cable Assy., Interface (See Gould Manual P/N M11-4781-01)	
5	CL-611346	Kit Assy., Rack Mount, 5900 Frame (See Gould Manual P/N M11-4781-01)	
6	31-119918-6204	Screw, Pan Hd., 6-32 x 1/4 In.	
7	11-1202-38	Kit Assy., Rack Mount (See Fig. 4-5)	
8	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
9	30-V7808-00	Recorder, Ink, 8 Channel (See Fig. 4-7)	A
9	30-V7606-00	Recorder, Ink, 6 Channel (See Fig. 4-7)	B

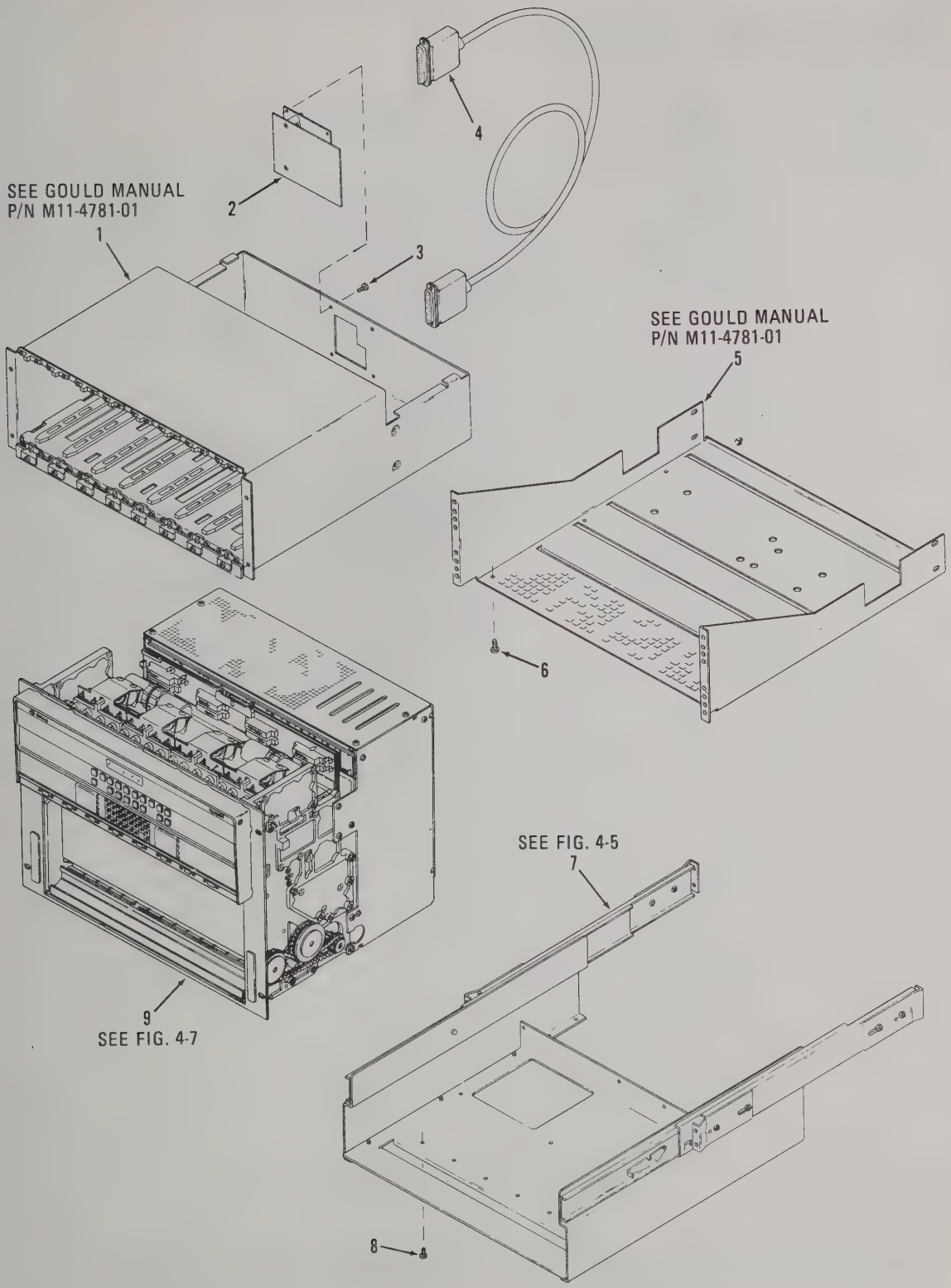


FIGURE 4-4 RACK MOUNTED RS3800 SERIES RECORDER WITH SIGNAL CONDITIONER FRAME

RS3800 & 3600 INK RECORDER
RS3800 RACK MOUNT, 30-V7808-11
FIGURE 4-5

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	30-V7808-11	Recording System, 8 Ch. Ink, Rack Mount	A
	30-V7606-11	Recording System, 6 Ch. Ink, Rack Mount	B
1	30-V7808-00	Recorder, Ink, 8 Channel	A
1	30-V7606-00	Recorder, Ink, 6 Channel	B
	11-1202-38	Kit Assy., Rack Mounting	
2	CL-210430-0218	Screw, Panel, Pan Hd., 10-32 X 1-1/8 In. w/Nylon Washer	
3	249961	Spacer	
4	1-261111-10	Retainer, Screw	
5	245244-02	Nut, Floating	
6	CL-711761	Plate, Shipping	
7	13-262716-0206	Screw, Self-Tapping, Pan Hd., 10-32 x 3/8 In.	
8	CL-811717	Slide Assy., Right	
9	13-262716-0206	Screw, Self-Tapping, Pan Hd., 10-32 x 3/8 In.	
10	1-118195-309	Washer, Plain, No. 10	
11	10-120053-106	Lockwasher, Ext. Tooth, 1/4 In.	
12	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
13	CL-811718	Slide Assy., Left	
14	497850	Saddle	

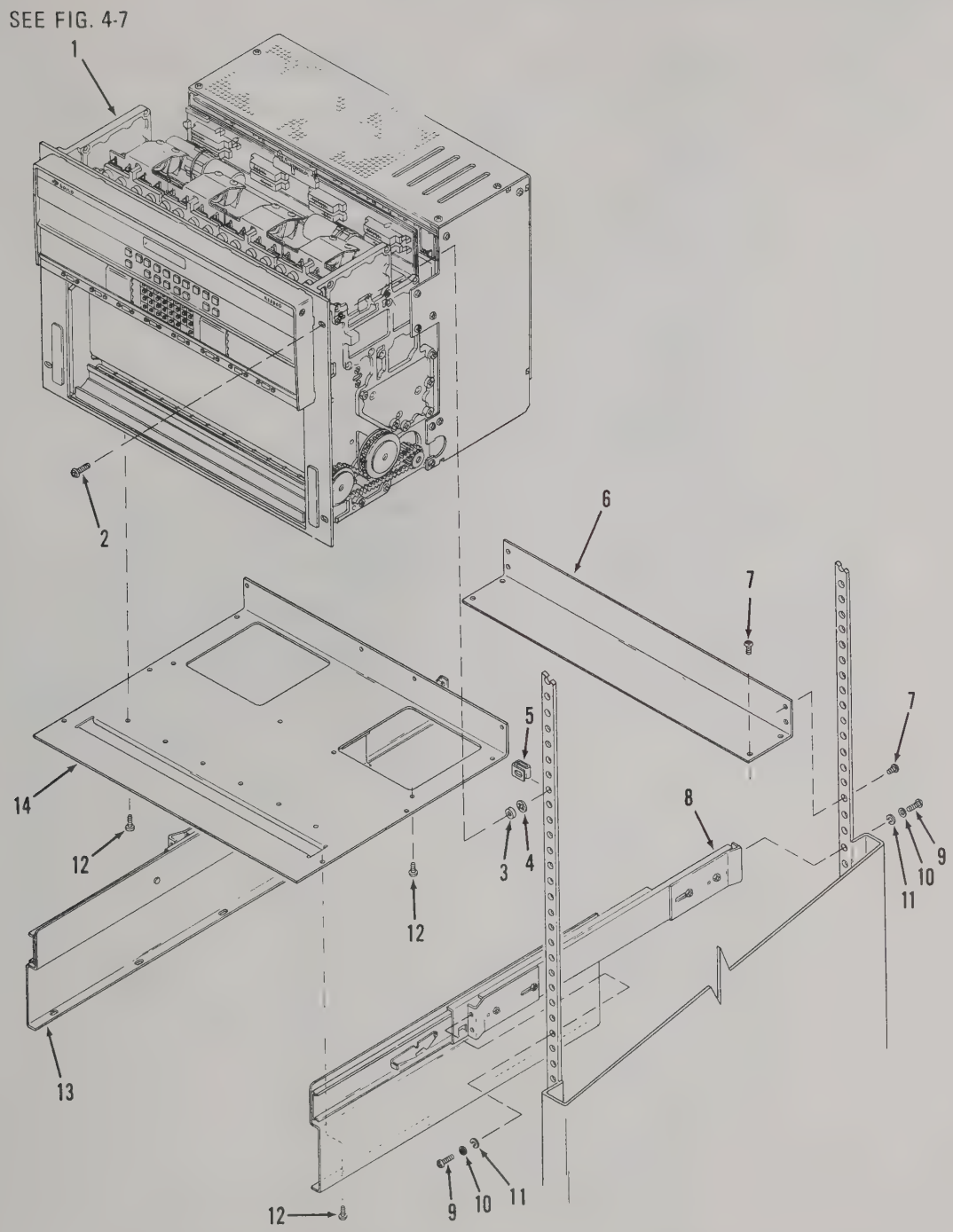


FIGURE 4-5 RS3800 SERIES RECORDER RACK MOUNTING ASSEMBLY

RS3800 & 3600 INK RECORDER
PORTABLE ENCLOSURE ASSY, CL-811054
FIGURE 4-6

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	CL-811054	Enclosure Assy., Portable	
1	CL-411990	Cover	
2	16-249616-8208	Screw, Machine, Pan Hd., Painted, 8-32 x 1/2 In.	
3	CL-811996	Brace Assy.	
4	13-262715-8206	Screw, Self-Tapping, Flat Hd., 8-32 x 3/8 In.	
5	CL-311192	Support	
6	31-119918-0208	Screw, Pan Hd., 10-32 x 1/2 In.	
7	230820-2	Plastic, Open-Cell, Adhesive	
8	CL-411995	Plate, Back	
9	31-119918-0208	Screw, Pan Hd., 10-32 x 1/2 In.	
10	245244-02	Nut, Floating	
11	CL-811038	Bezel Assy.	
12	CL-411053	Handle	
13	13-262715-0212	Screw, Self-Tapping, Flat Hd., 10-32 x 3/4 In.	
14	CL-411051	Cover, Side	
15	13-262716-8204	Screw, Self-Tapping, Pan Hd., 8-32 x 1/4 In.	
16	266107-2	Bail Assy. (Feet)	
17	13-262716-6206	Screw, Self-Tapping, Pan Hd., 6-32 x 3/8 In.	
18	CL-411039	Base	
19	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	

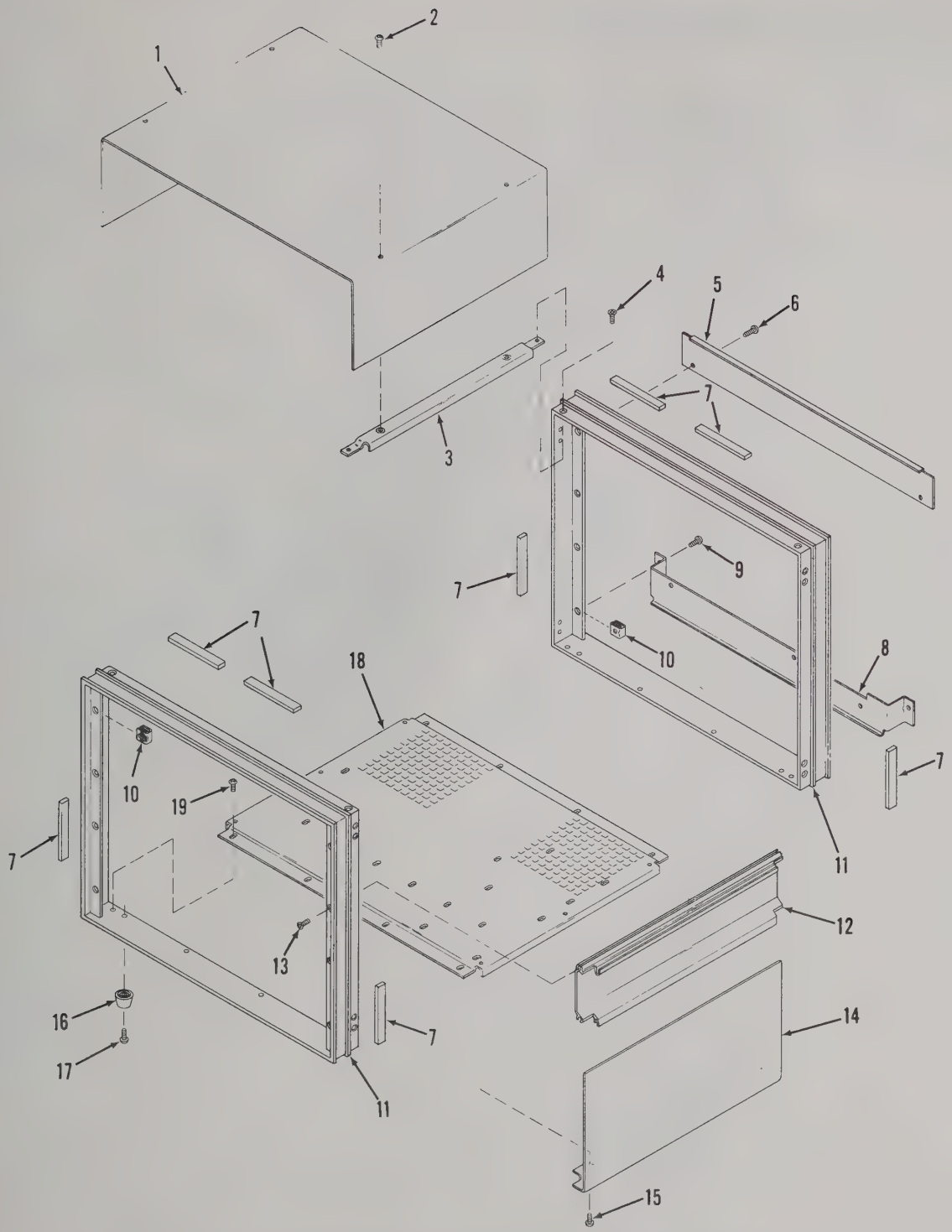


FIGURE 4-6 PORTABLE ENCLOSURE ASSEMBLY

RS3800 & 3600 INK RECORDER
RECORDER ASSY., 30-V7808-00
FIGURE 4-7

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	30-V7808-00	Recorder, Ink, 8 Channel	A
	30-V7606-00	Recorder, Ink, 6 Channel	B
1	*CL-810609-1	Control Panel Assy. (See Fig. 4-15)	A
1	*CL-810609-2	Control Panel Assy. (See Fig. 4-15)	B
2	CL-211573	Latch	
3	13-262715-6206	Screw, Self-Tapping, Flat Hd., 6-32 x 3/8 In.	
4	CL-211572	Nut, Pivot	
5	CL-210538	Bushing, Pivot	
6	13-262715-6210	Screw, Self-Tapping, Flat Hd., 6-32 x 5/8 In.	
7	Not Procurable	Transport and Pen Bar Assy. (See Fig. 4-8)	
8	CL-610559	Cable Assy., Penmotor	
9	Not Procurable	PC Board and Card Cage Assy. (See Figs. 4-16 and 4-17)	
10	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
11	CL-710520-2	Cable Assy., Flat	
12	CL-710606	Panel & Bezel Assy. (See Fig. 4-14)	
13	243898-02	Nut, Assembled Lockwasher, No. 10-32	

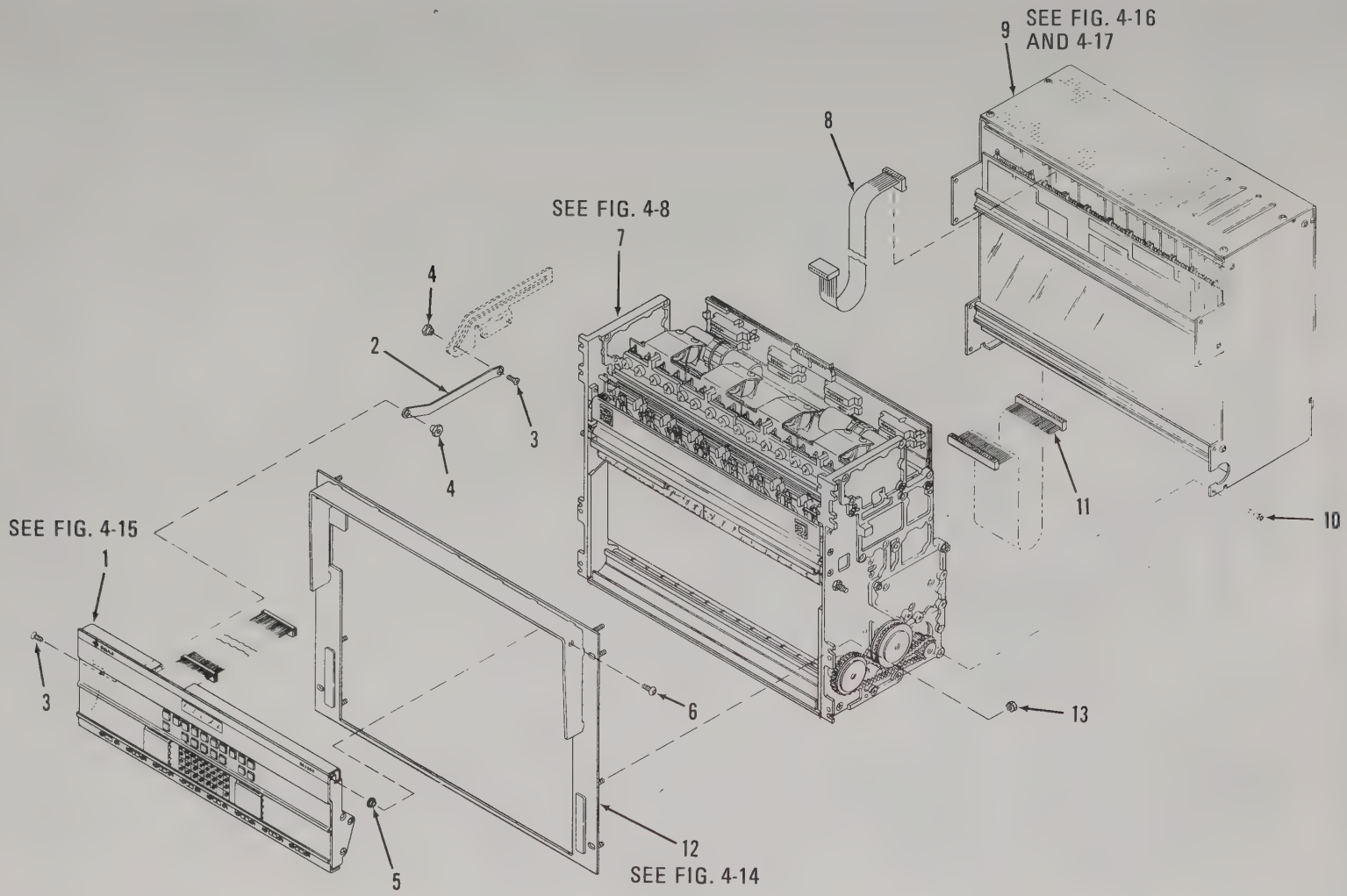


FIGURE 4-7 RECORDER ASSEMBLY

RS3800 & 3600 INK RECORDER
TRANSPORT, PEN BAR AND WRITING TABLE ASSY.
FIGURE 4-8

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	Not Procurable	Transport and Pen Bar Assy.	
1	CL-710638	Pen Assy., Ink, 40/50 MM (Replacement Pen Kit 11-2823-3A)	
2	CL-611575	Clamp Assy.	
3	31-119917-0005	Screw, Machine, Fillister Hd., 0-80 x 5/16 In.	
4	CL-211269	Clamp, Pen	
5	285266-1	Spacer	
6	*897954-1	Pen Bar Assy., Ink (See Fig. 4-12)	A
6	*897954-2	Pen Bar Assy., Ink (See Fig. 4-12)	B
7	13-262715-8214	Screw, Self-Tapping, Flat Hd., 8-32 x 7/8 In.	
8	13-262716-8214	Screw, Self-Tapping, Pan Hd., 8-32 x 7/8 In.	
9	CL-811657	Transport Assy. (See Fig. 4-9)	
10	CL-710420-1	Support Assy., Window	
11	897874-1	Table Assy., Writing, 8 Channel (See Fig. 4-13)	A
11	897874-2	Table Assy., Writing, 6 Channel (See Fig. 4-13)	B
12	CL-210327	Screw, Dog, Eccentric	
13	CL-210330	Nut	
14	CL-710359	Plug Assy., Core, Right	
15	397737	Plug Core, Left	
16	CL-611661-1	Plug Support Assy.	

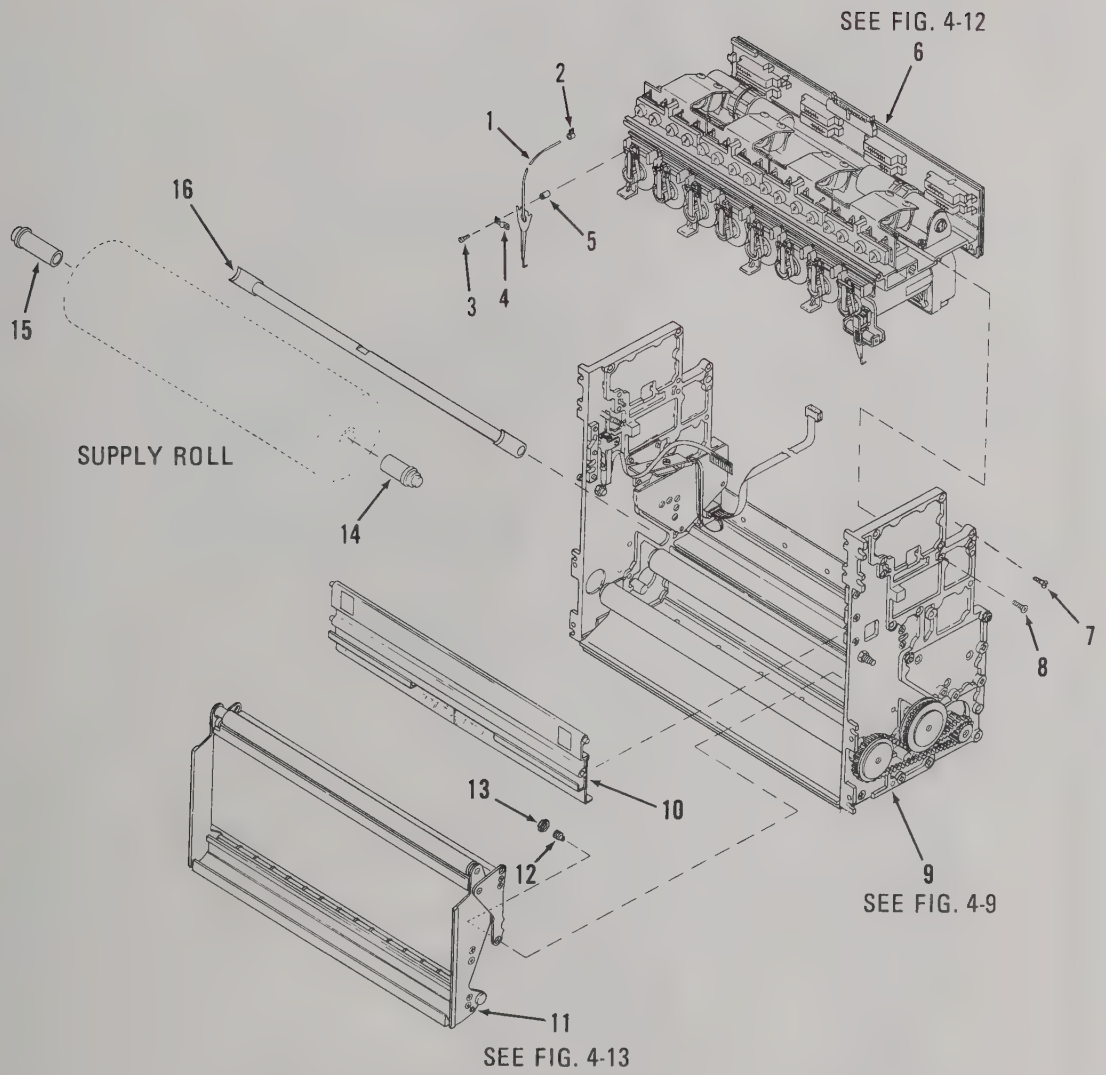


FIGURE 4-8 TRANSPORT AND PEN BAR ASSEMBLY

RS3800 & 3600 INK RECORDER
TRANSPORT ASSY., CL-811657
FIGURE 4-9

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	*CL-811657	Transport Assy.	
1	CL-310524	Wing, Left	
2	CL-310916	Bracket, Sensor	
3	13-262716-8214	Screw, Self-Tapping, Pan Hd., 8-32 x 7/8 In.	
4	CL-610338	Cable Assy., Monitor	
	CL-711716	Annotation Assy., Left	
5	31-121166-2602	Screw, Set, Socket Hd., Cup Point, 2-56 x 1/8	
6	1-264521-16	Spring	
7	31-119922-2610	Screw, Cap, Socket Hd., 2-56 x 5/8 In.	
8	1-240031-20	Spring, Extension	
9	CL-210473	Collar	
10	CL-410493	Arm, Annotation	
11	CL-610594	Head & Arm Assy.	
12	1-118195-302	Washer, Plain, No. 1	
13	31-119918-2605	Screw, Pan Hd., 2-56 x 5/16 In.	
14	897912	Cable Assy., Paper Sensor	
15	CL-210245	Spacer, Rubber	
16	298042	Sensor	
17	797724-1	Cover, Modified	
18	13-262715-8212	Screw, Self-Tapping, Flat Hd., 8-32 x 3/4 In.	
19	CL-811566	Plate Assy., Right Side (See Fig. 4-10)	
20	265741-1	Bearing, Ball	
21	121271	Washer, Bronze, Phosphor, 0.257 In. ID x 0.38 In. OD	
22	2-240731-10	Ring, Retaining, External	
23	694520-1	Pulley Assy., 32 Teeth	
24	297805-1	Belt, Dual	
25	694520	Pulley Assy., 30 Teeth	
26	297910	Collar, Spacer	
27	CL-211466	Spacer, Wire	
28	CL-810240	Board Assy., Paper Out Sensor (See Fig. 4-31)	
29	31-119918-4004	Screw, Pan Hd., 4-40 x 1/4 In.	
30	CL-210980	Motor, Stepper	
31	31-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
32	697648	Mount Assy, Motor	
33	CL-211019	Pulley (Includes Set Screw)	
34	397869-1	Roll, Drive	
35	397721	Cam, Pressure Roll	
36	797695-1	Chute, Modified	
37	13-262715-8212	Screw, Self-Tapping, Flat Hd., 8-32 x 3/4 In.	
38	267426-4	Deflector, Paper	
39	CL-811567	Plate Assy., Left Side (See Fig. 4-11)	
40	232997-23	Strap, Retaining Cable	
41	CL-710336	Wheel Assy., Timing	
42	CL-810290	Board Assy., Chan. Speed Monitor (See Fig. 4-32)	
43	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
44	243898-82	Nut, Assembled Lockwasher, No. 8-32	

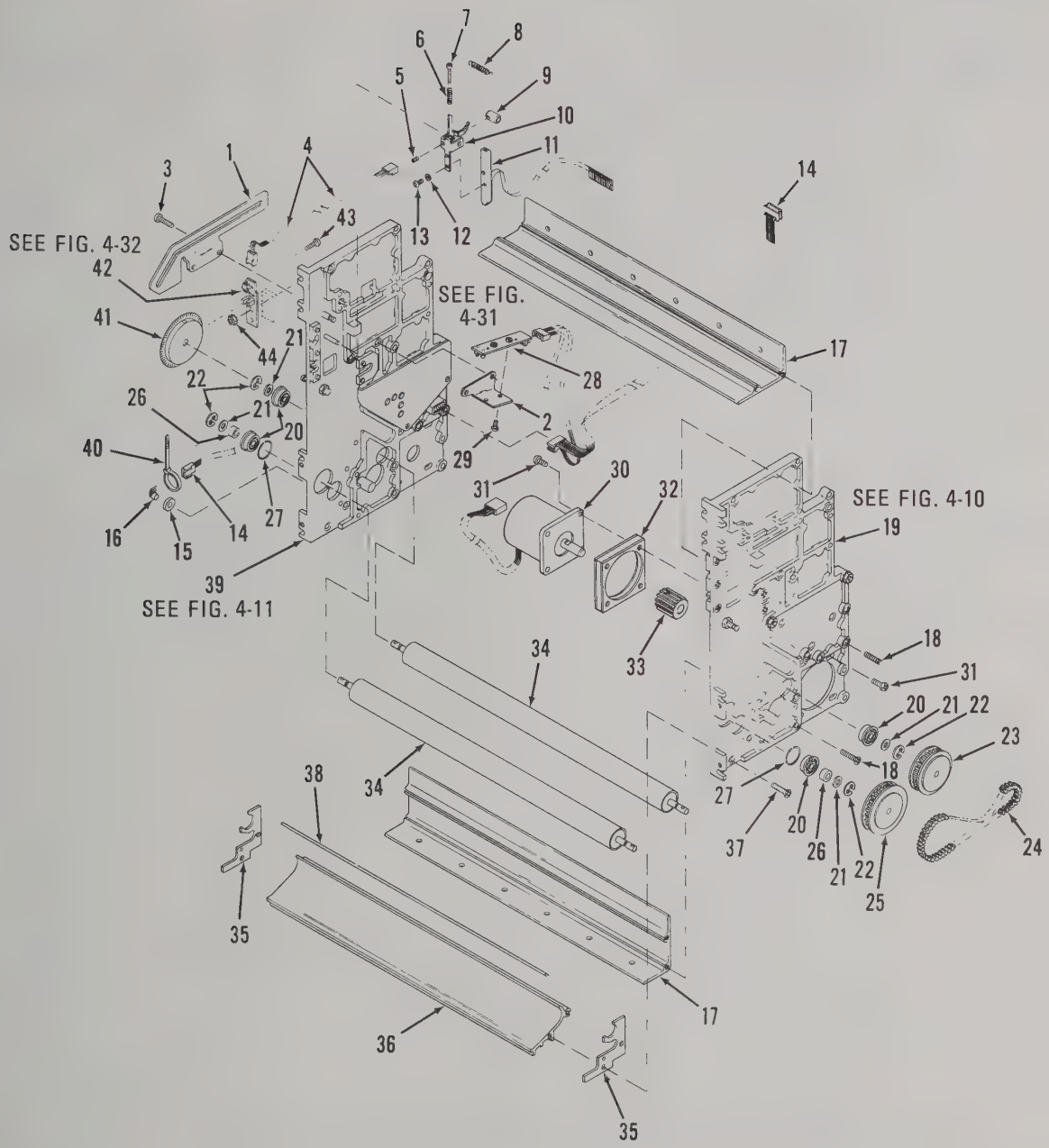


FIGURE 4-9 TRANSPORT ASSEMBLY

RS3800 & 3600 INK RECORDER
RIGHT SIDE PLATE ASSY., CL-811566
FIGURE 4-10

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	CL-811566	Side Plate Assy., Right	
1	797625	Guide Assy., Right	
2	243898-82	Nut, Assembled Lockwasher, No. 8-32	
3	CL-411227	Side Plate, Front Right	
4	397640	Catch, Cover	
5	297639	Slide	
6	13-262715-8206	Screw, Self-Tapping, Flat Hd., 8-32 x 3/8 In.	
7	297803	Stud	
8	297638	Nut, Stud, 0.250-32 UNEF-2B	

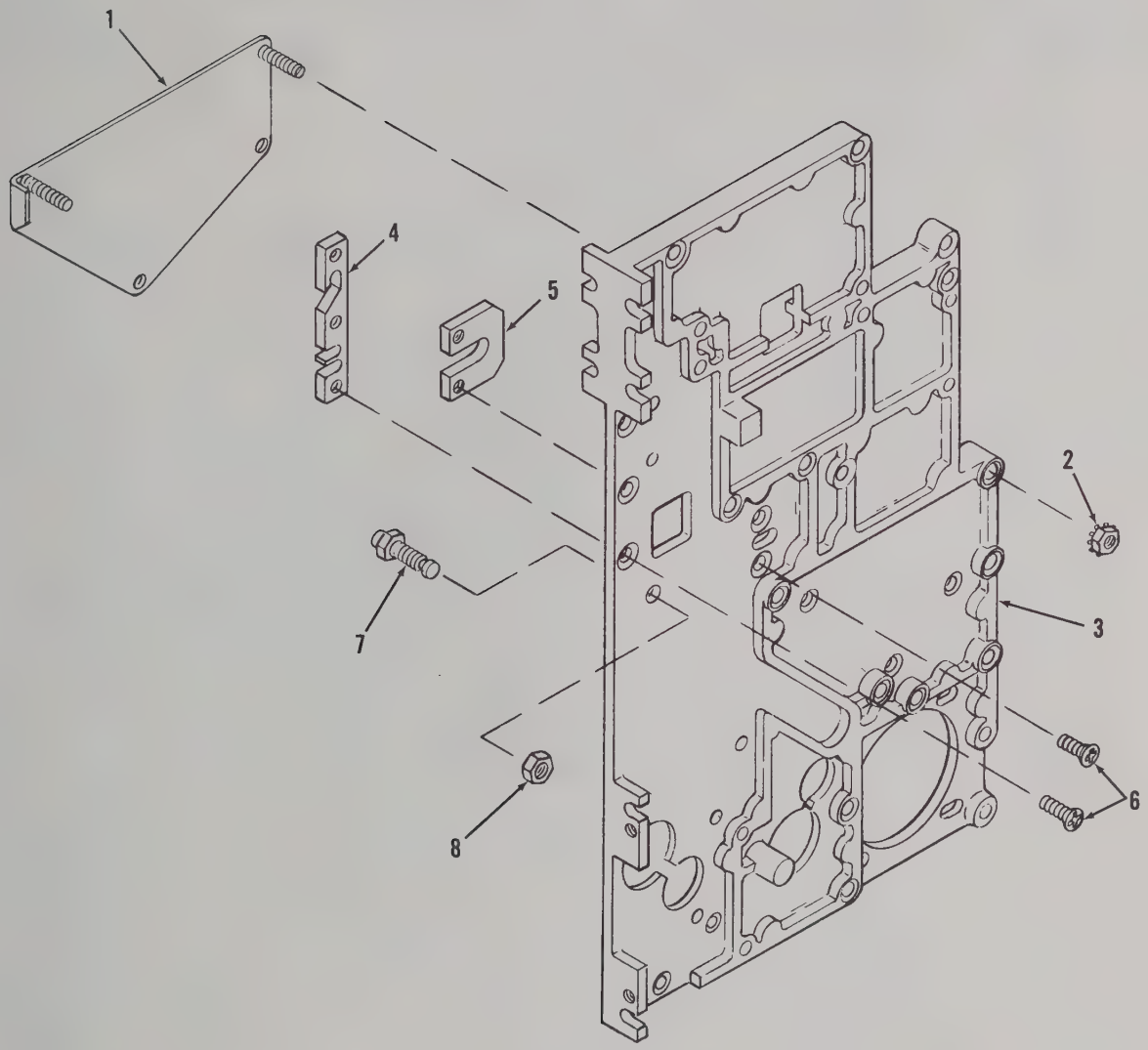


FIGURE 4-10 RIGHT HAND SIDE PLATE ASSEMBLY

RS3800 & 3600 INK RECORDER
LEFT SIDE PLATE ASSY., CL-811567
FIGURE 4-11

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	CL-811567	Side Plate Assy., Left	
1	265874-3	Pin, Spring	
2	CL-211563	Pin, Annotation Support	
3	797626	Guide Assy., Left	
4	243898-82	Nut, Assembled Lockwasher, No. 8-32	
5	897635	Board Assy., Paper Sensor (See Fig. 4-21)	
6	297639	Slide	
7	397640	Catch, Cover	
8	13-262715-8206	Screw, Self-Tapping, Flat Hd., 8-32 x 3/8 In.	
9	CL-411228	Side Plate, Front Left	
10	297803	Stud	
11	297638	Nut, Stud, 0.250-32 UNEF-2B	

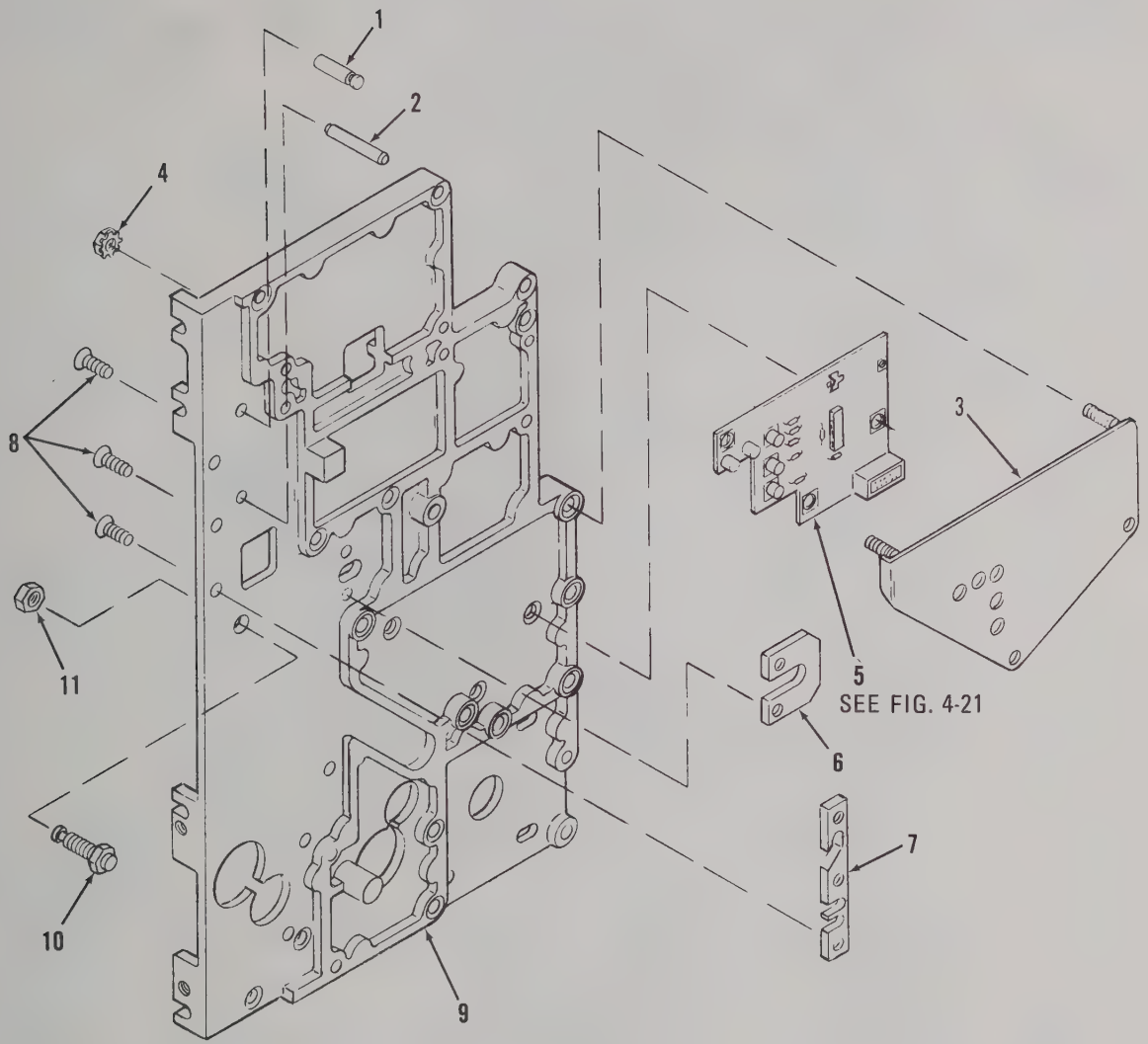


FIGURE 4-11 LEFT HAND SIDE PLATE ASSEMBLY

RS3800 & 3600 INK RECORDER
INK PEN BAR ASSY., 897954-X
FIGURE 4-12

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	*897954-1	Pen Bar Assy., Ink, 8 Channel	A
	*897954-2	Pen Bar Assy., Ink, 6 Channel	B
1	CL-610648-1	Cable Assy., Ink Solenoid	
2	897813-1	Board Assy., Mother-In-Law (See Fig. 4-28)	
3	CL-310958-1	Shield, Board	
4	13-262716-8212	Screw, Self-Tapping, Pan Hd., 8-32 x 3/4 In.	
5	297915-2	Washer, Spacer, Nylon, 0.375 In. Thk, 0.190 In. ID x 1/2 In. OD	
6	766243	Ink Plunger Assy.	
7	13-262716-6206	Screw, Self-Tapping, Pan Hd., 6-32 x 3/8 In.	
8	CL-810212	Bar, Penmotor Mounting, 8 Channel	A
8	CL-810171	Bar, Penmotor Mounting, 6 Channel	B
9	798053	Event Marker Assy., 40 MM, 8 Channel	A
9	CL-710145	Event Marker Assy., 50 MM, 6 Channel	B
10	267272-2	Washer, Flat	
11	31-119917-0003	Screw, Machine, Fillister Hd., 0-80 X 3/16 In.	
12	1-118195-303	Washer, Plain, No. 2	
13	1-216741-401	Lockwasher, Spring, Plain, No. 2	
14	31-119918-2605	Screw, Pan Hd., 2-56 x 5/16 In.	
15	CL-210577	Shield, Penmotor	
16	31-119918-8203	Screw, Pan Hd., 8-32 x 3/16 In.	
17	CL-310935	Bracket, Tip Support, Left	
18	1-216741-401	Lockwasher, Spring, Plain, No. 2	
19	31-119918-2605	Screw, Pan Hd., 2-56 x 5/16 In.	
20	896683	Penmotor Assy.	
21	1-118195-307	Washer, Plain, No. 8	
22	1-216741-425	Lockwasher, Spring, Copper, No. 8	
23	31-119922-8206	Screw, Cap, Hex Socket Hd., 8-32 x 3/8 In.	
24	298051	Bar, Nut	
25	897960-1	Ink Valve Assy.	
26	13-262716-6206	Screw, Self-Tapping, Pan Hd., 6-32 x 3/8 In.	
27	267624	Tubing	
28	11-2731-01	Ink Cartridge Assy.	
29	267426-7	Deflector, Paper	
30	CL-710618	Pen Assy., Event, Ink (Replacement Kit 11-2873-2A)	
31	CL-611575	Clamp Assy.	

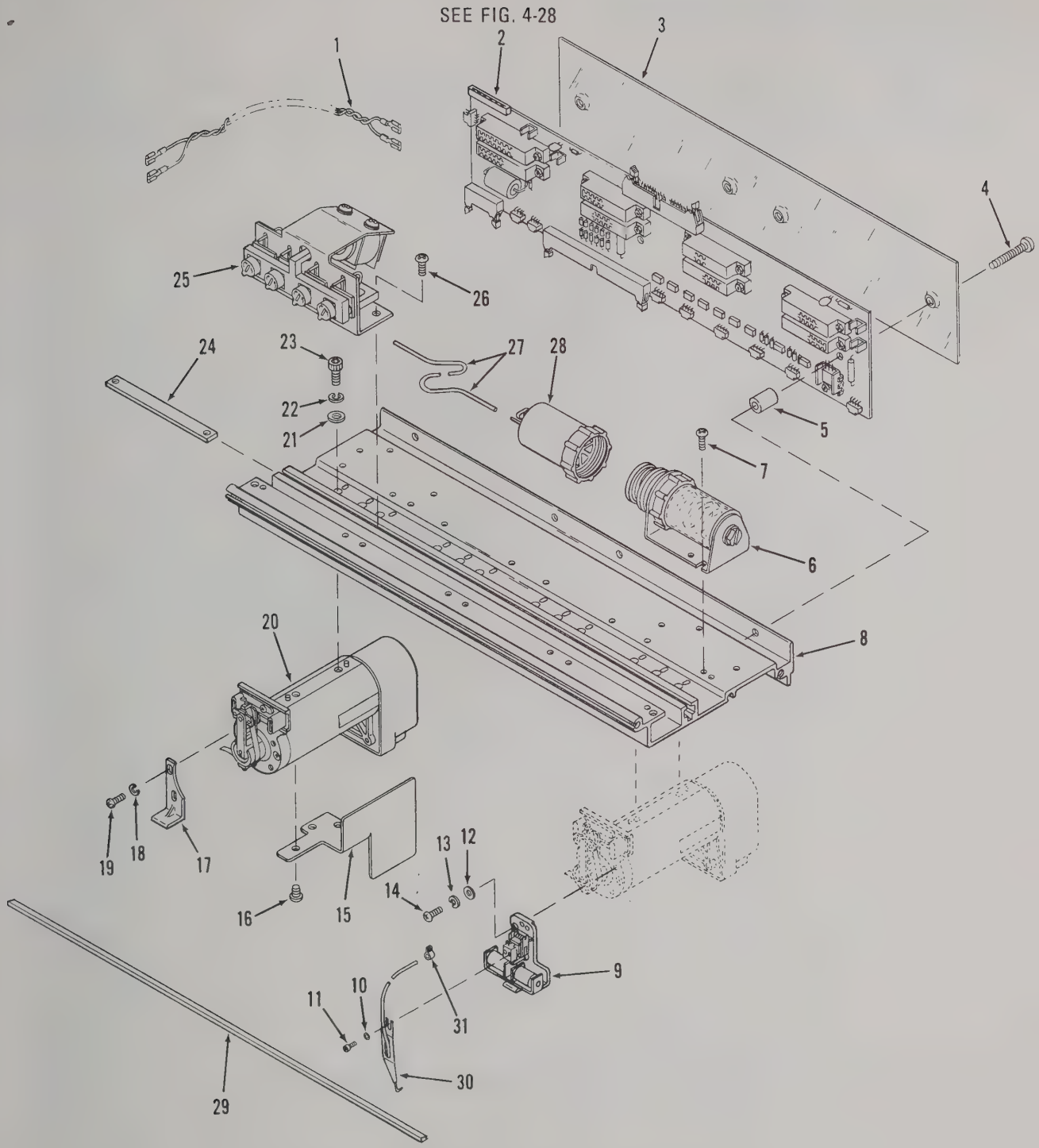


FIGURE 4-12 INK PEN BAR ASSEMBLY

RS3800 & 3600 INK RECORDER
WRITING TABLE ASSY., 897874-X
FIGURE 4-13

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	897874-1	Table Assy., Writing	A
	897874-2	Table Assy., Writing	B
1	397864	Link, Left	
2	CL-210102-1	Tie Bar	
3	397863	Link, Right	
4	13-262715-6206	Screw, Self-Tapping, Flat Hd., 6-32 x 3/8 In.	
5	1-210761-6	Bearing, Ball	
6	797861	Support Assy., Right, Ink	
7	297858	Support, Bearing	
8	297638	Nut, Stud, 0.250-32 UNEF-2B	
9	CL-210183-0206	Screw, Cap, Low Hd. Socket, 10-32 x 3/8 In.	
10	13-262715-6206	Screw, Self-Tapping, Flat Hd., 6-32 X 3/8 In.	
11	243867-1	"O" Ring	
12	1-297841-10	Ball Plunger	
13	797851-1	Bar, Pull	
14	497793	Roll, Pressure	
15	CL-710401-1	Bar, Writing, 8 Channel	A
15	CL-710401-2	Bar, Writing, 6 Channel	B
16	797862-1	Support Assy., Left, Ink, 8 Channel	A
16	797862-2	Support Assy., Left, Ink, 6 Channel	B
17	13-262715-6206	Screw, Self-Tapping, Flat Hd., 6-32 x 3/8 In.	
18	CL-210399	Roll, Rubber	
19	1-210761-6	Bearing, Ball	
20	CL-211232-1	Roll, Rubber	

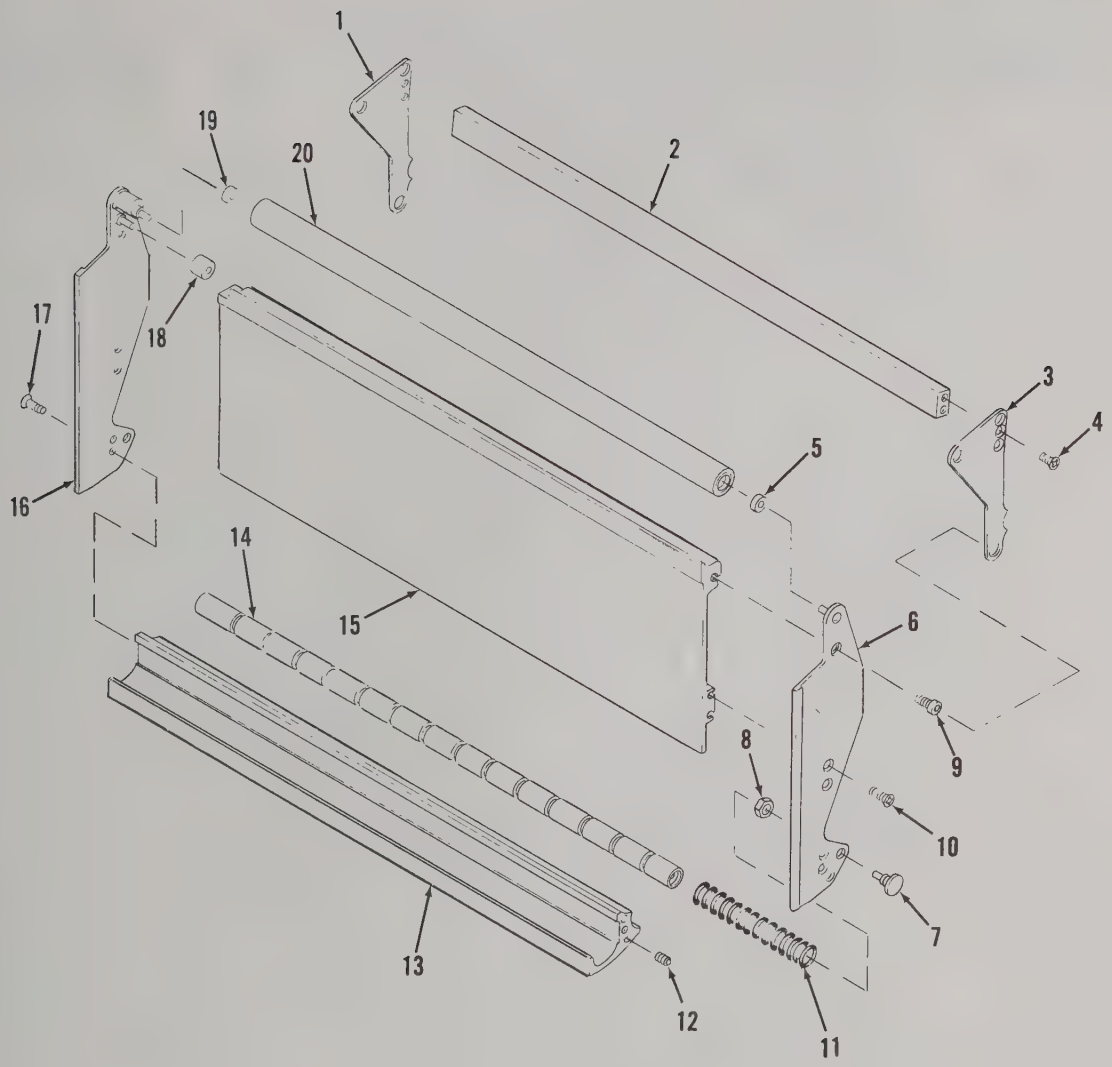


FIGURE 4-13 WRITING TABLE ASSEMBLY

RS3800 & 3600 INK RECORDER
PANEL AND BEZEL ASSY., CL-710606
FIGURE 4-14

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	CL-710606	Panel & Bezel Assy.	
1	CL-410531	Bezel	
2	13-262716-8204	Screw, Self-Tapping, Pan Hd., 8-32 x 1/4 In.	
3	CL-710601	Front Panel Assy.	
4	310416	Cap, Panel	

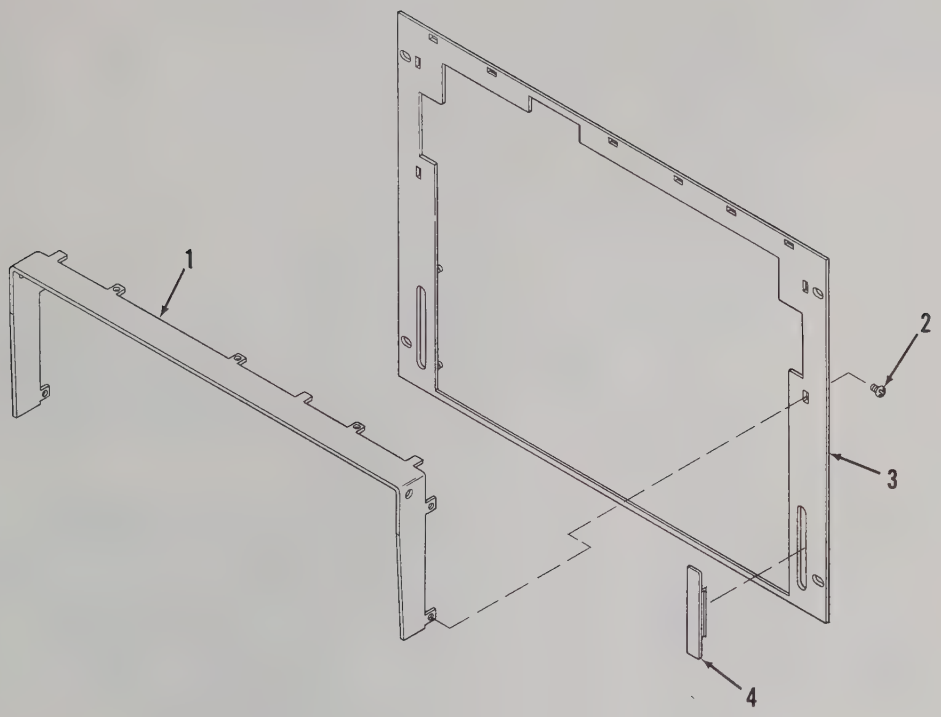


FIGURE 4-14 PANEL AND BEZEL ASSEMBLY

RS3800 & 3600 INK RECORDER
CONTROL PANEL ASSY., CL-810609-X
FIGURE 4-15

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	*CL-810609-1	Control Panel Assy., 8 Channel	A
	*CL-810609-2	Control Panel Assy., 6 Channel	B
1	CL-410385	Side, Keybox, Left	
2	CL-810419	Keybox, Back	
3	31-119920-6208	Screw, Machine, Flat Hd., 6-32 x 1/2 In.	
4	CL-210811-1	Fastener, Scotchmate	
5	CL-410386	Side, Keybox, Right	
6	13-262715-6206	Screw, Self-Tapping, Flat Hd., 6-32 x 3/8 In.	
7	297915-3	Washer, Spacer, Nylon, 1/4 In. Thk, 0.170 In. ID x 0.350 In. OD	
8	897783	Board Assy., P.C., Panel, 8 Channel (See Fig. 4-27)	A
8	CL-810186	Board Assy., P.C., Panel, 6 Channel (See Fig. 4-29)	B
9	297908-1	Button, Switch	
10	CL-410348	Door, Keyboard	
11	CL-810636	Control Panel Assy., Overlay, 8 Channel	A
11	CL-410708	Overlay, Top (RS3800)	A
11	CL-410709	Overlay, Middle (Keyboard)	A
11	CL-410707	Overlay, Bottom (Pen Position)	A
11	CL-810637	Control Panel Assy., Overlay, 6 Channel	B
11	CL-410711	Overlay, Top (RS3600)	B
11	CL-410709	Overlay, Middle (Keyboard)	B
11	CL-410710	Overlay, Bottom (Pen Position)	B
12	CL-710619-1	Button, Stamped, STOP	
13	CL-710619-2	Button, Stamped, 5	
14	CL-710619-3	Button, Stamped, 10	
15	CL-710619-4	Button, Stamped, 25	
16	CL-710619-5	Button, Stamped, 50	
17	CL-710619-6	Button, Stamped, 100	
18	CL-710619-7	Button, Stamped, 250	
19	CL-710619-8	Button, Stamped, 500	
20	CL-710619-9	Button, Stamped, VAR SPEED	
21	CL-710619-10	Button, Stamped, DIVIDE BY	
22	CL-710619-11	Button, Stamped, EXT	
23	CL-710619-12	Button, Stamped, CHART SPLY	
24	CL-710619-13	Button, Stamped, LOCAL RMT	
25	CL-710619-14	Button, Stamped, PRINT	
26	CL-710619-15	Button, Stamped, LEFT EVENT	
27	CL-710619-16	Button, Stamped, RIGHT EVENT	

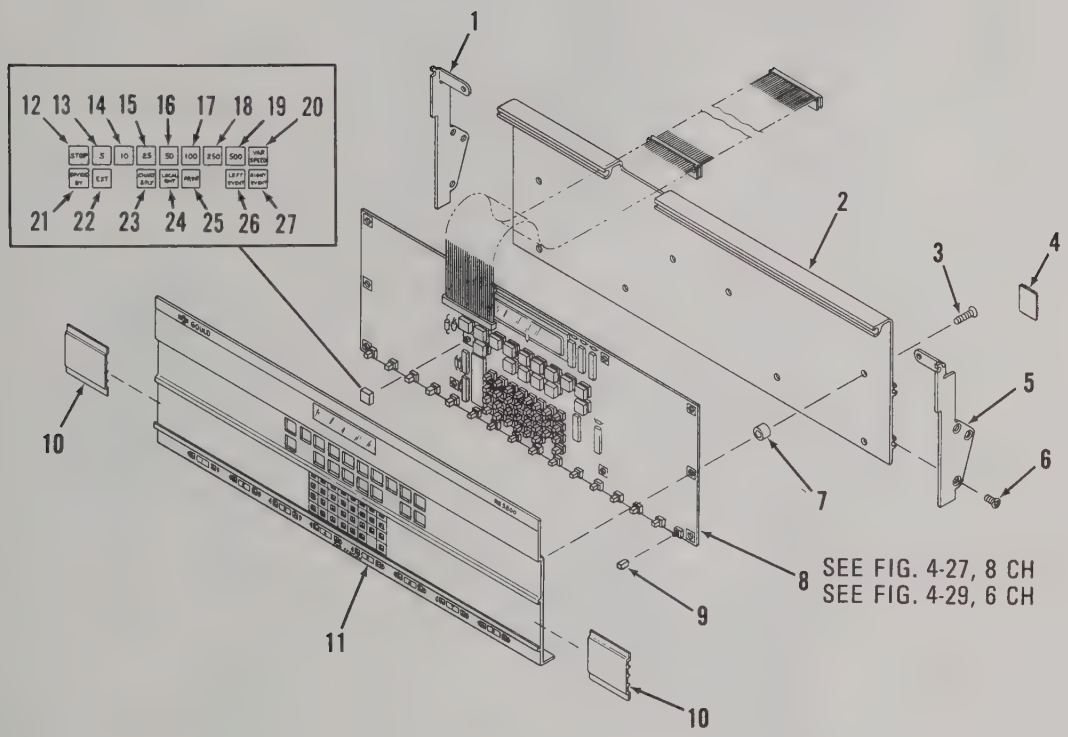


FIGURE 4-15 CONTROL PANEL ASSEMBLY

RS3800 & 3600 INK RECORDER
PC BOARD INSTALLATION
FIGURE 4-16

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
		PC Board Installation	
1	CL-210649	Window, Voltage	
2	13-262715-8206	Screw, Self-Tapping, Flat Hd., 8-32 x 3/8 In.	
3	CL-811460	Panel Assy., Silkscreen	
4	13-262716-8204	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
5	CL-810104	Card Cage Assy. (See Fig. 4-17)	
6	497867	Power Supply, Dual Assy.	
7	897515	Board Assy., Power Supply, 5 V. (See Fig. 4-19)	
8	897658	Board Assy., Chart Drive (See Fig. 4-24)	
9	897637	Board Assy., Controller (See Fig. 4-23)	
10	CL-810312	Board Assy., Dummy Interface	
11	897406	Board Assy., Pen Servo Control (See Fig. 4-18)	

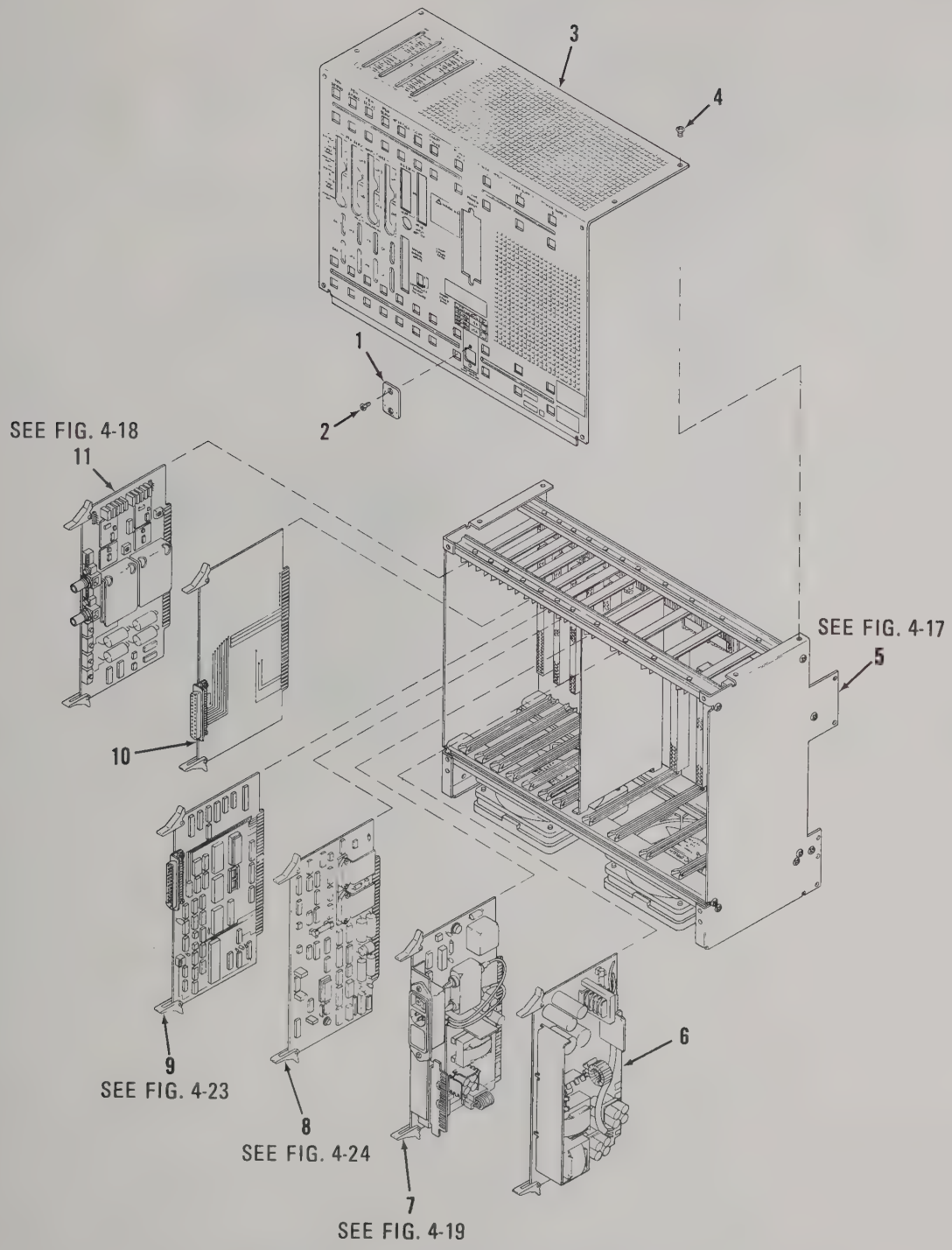


FIGURE 4-16 PC BOARD INSTALLATION

RS3800 & 3600 INK RECORDER
CARD CAGE ASSY., CL-810104
FIGURE 4-17

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
	*CL-810104	Card Cage Assy.	
1	797904-1	Support, Mother Board	
2	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
3	CL-310958-4	Shield, Board	
4	297915-1	Washer, Spacer, Nylon, 0.165 In. Thk., 0.165 In. ID x 1/2 In. OD	
5	897517	Board Assy., Mother (See Fig. 4-20)	
6	13-262716-8208	Screw, Self-Tapping, Pan Hd., 8-32 x 1/2 In.	
7	497847	Side Plate, Rear Left	
	*897918	Fan Assy.	
8	797919-1	Support, Fan	
9	297719	Fan	
10	297715-1	Filter Assy.	
10	297715-2	Filter Element	
11	13-262716-0208	Screw, Self-Tapping, Pan Hd., 10-32 x 1/2 In.	
12	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
	*797905-1	Card Guide Assy.	
13	897906-1	Support, Card Guide	
14	297800-2	Card Guide	
15	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
16	397929	Mid Plate, Rear	
17	13-262716-8206	Screw, Self-Tapping, Pan Hd., 8-32 x 3/8 In.	
18	497846	Side Plate, Rear Right	

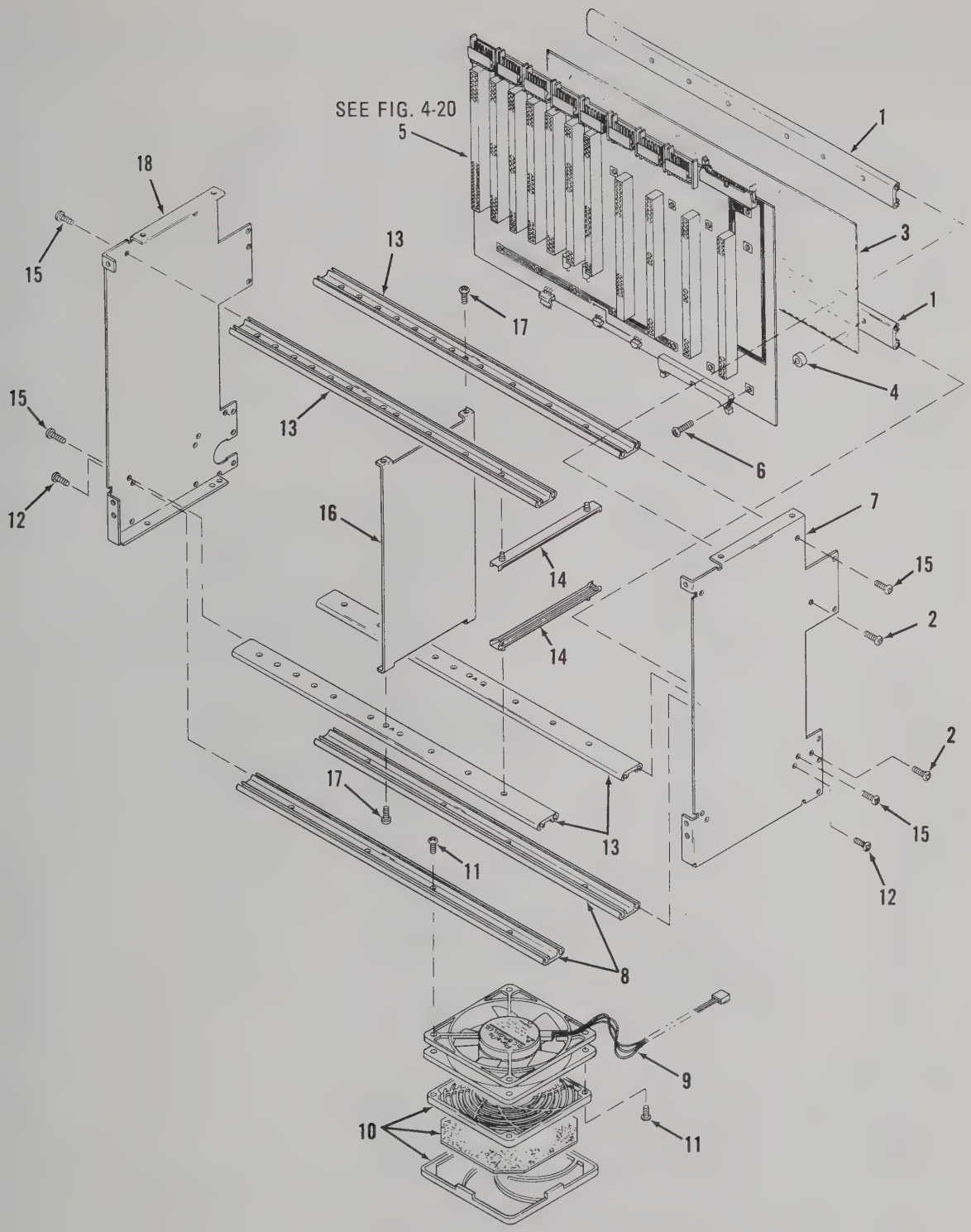


FIGURE 4-17 CARD CAGE ASSEMBLY

RS 3600 & RS 3800
PC BOARD ASSY., SERVO DRIVE 897406
FIGURE 4-18

DESIGNATION	PART NUMBER	DESCRIPTION
C1	287614-223	Capacitor 0.022UF
C2,C3	263386-108	Capacitor 1000UF
C4-C7	262585-106	Capacitor 10.0UF
C8-C10	288755-103	Capacitor 0.01UF
C11	262585-106	Capacitor 10.0UF
C12	287614-222	Capacitor 0.0022UF
C13	287614-103	Capacitor 0.01UF
C14	287614-221	Capacitor 0.00022UF
CB1,CB2	297966-3	Circuit Breaker
CR1,CR2	270508	Diode 1N4454
EJ1	290306-1	Ejector White (Not Shown)
EJ2	290306-2	Ejector Red (Not Shown)
J1	298040	BNC Connector
J2	297967	Phone Jack
K1	288753	Relay
L1	CL-210014-1	Inductor 2.2MH
Q1-Q9	Not Used	
Q10	281702-2	Transistor 2N4401
R1,R2	293941-103	Potentiometer 10K
R3	293941-503	Potentiometer 50K
R4,R5	293941-502	Potentiometer 5K
R6	284878-103	Potentiometer 10K
R7	CL-210097-1003	Resistor 100K
R8	CL-210097-2503	Resistor 250K
R9	CL-210097-5003	Resistor 500K
R10	CL-210097-1673	Resistor 167K
R11	CL-210097-1253	Resistor 125K
R12	CL-210099-2001	Resistor 2K
R13	CL-210099-5000	Resistor 500 Ohms
R14	CL-210099-1803	Resistor 180K
R15-R26	Not Used	
R27	CL-210099-2000	Resistor 200 Ohms
R28	CL-210099-1002	Resistor 10K
R29	CL-210099-2002	Resistor 20K
R30	CL-210099-5001	Resistor 5K
R31	CL-210099-2002	Resistor 20K
R32	CL-210099-1001	Resistor 1K
R33	CL-210099-5001	Resistor 5K
R34	CL-210099-1001	Resistor 1K
R35	CL-210099-1003	Resistor 100K

RS 3600 & RS 3800
PC BOARD ASSY., SERVO DRIVE 897406 (cont.)
FIGURE 4-18

DESIGNATION	PART NUMBER	DESCRIPTION
R36	CL-210099-4703	Resistor 470K
R37	CL-210099-1001	Resistor 1K
R38	CL-210099-2002	Resistor 20K
R39	CL-210099-6202	Resistor 62K
R40	293941-103	Potentiometer 10K
R41	5-241111-226	Resistor 22 Meg
SW1	297965-6	DIP Switch
TP	2-287495-6	Connector
U1	297499	Control Amplifier Hybrid
U2	297498	Oscillator Demodulator Hybrid
U3	CL-810380	Pen Servo Output Module
U4	CL-210009	I.C. MP7542
U5	296119-2	I.C. LF412
U6	291593	I.C. MC7812 (A-P)
	31-119918-4005	Screw
	243898-40	Nut
		----- * -----
U7	291592	I.C. MC7912 (A-P)
	31-119918-4005	Screw
	243898-40	Nut
		----- * -----
U8	296674-139	I.C. 74HC139
U9	296674-74	I.C. 74HC74
U10	289388	I.C. 78L05
U11	297306	I.C. LT1012CN8

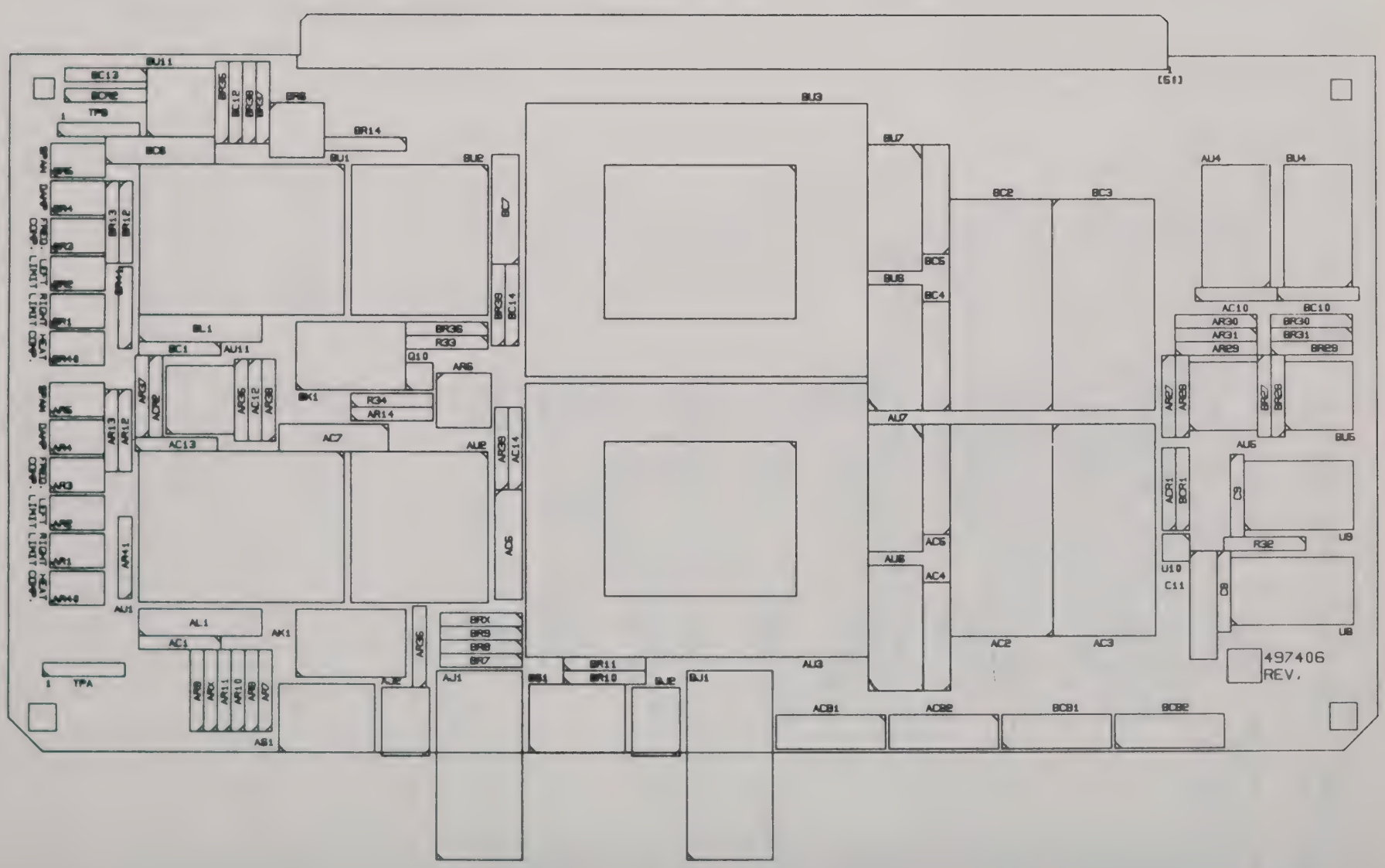


FIG. 4-18 SERVO DRIVE BOARD

RS 3600 & RS 3800
PC BOARD ASSY., 5 VOLT POWER SUPPLY 897515
FIGURE 4-19

DESIGNATION	PART NUMBER	DESCRIPTION
B1	CL-210118	Battery (A-P)
	232997-23	Tie Wrap
		----- * -----
BH1	CL-210206	Battery Holder
C1	Not Used	
C2	287614-223	Capacitor 0.022UF
C3-C9	Not Used	
C10-C12	283943-106	Capacitor 10UF
CR1-CR8	Not Used	
CR9	269256-7	Diode IN4057
EJ1	290306-1	Ejector White (Not Shown)
EJ2	290306-2	Ejector Red (Not Shown)
J1	1-293738-60	Connector
J2	CL-610789	Line Filter Cable Assy.
J3	CL-610788	Cable Assy.
J4,J5	Not Used	
J6	CL-610790	Cable Assy.
J7	CL-610791	Line Input Cable Assy.
K1	294198-40	Relay
L1	CL-210014-1	Inductor
LF	CL-210204	RFI Filter (A-P)
	31-119918-6204	Screw
	1-216741-420	Lockwasher
	31-119998-62	Nut
		----- * -----
P1	CL-810466	P.C. Board Voltage/Select (Not Shown)
P2-P4	281711-6	Connector
P5	Not Used	
P6	281711-6	Connector
PR1	CL-210203	Power Receptacle (A-P)
	CL-310215	Bracket
	13-262716-6210	Screw
		----- * -----
PSM1	CL-210774	Power Supply Module (A-P)

DESIGNATION	PART NUMBER	DESCRIPTION
	31-119918-6210	Screw
	297915-4	Washer
	297915-3	Spacer
	1-216741-420	Lockwasher
	31-119998-62	Nut
		----- * -----
R1,R2	Not Used	
R3	CL-210099-4990	Resistor
R4-R10	Not Used	
R11	CL-210099-4991	Resistor
RN1,RN2	Not Used	
RN3	297492	Resistor Network
TP1	Not Used	
TP2	265763-3	Contact
U1	CL-210196	DC/DC Convertor
U2-U4	Not Used	
U5	296678	I.C. LH0070
U6	291062-3	I.C. TL084CN
U7	CL-610991	I.C. Programmed
U8	297307-3	I.C. LF13333N
UX1	285593-20	I.C. Socket

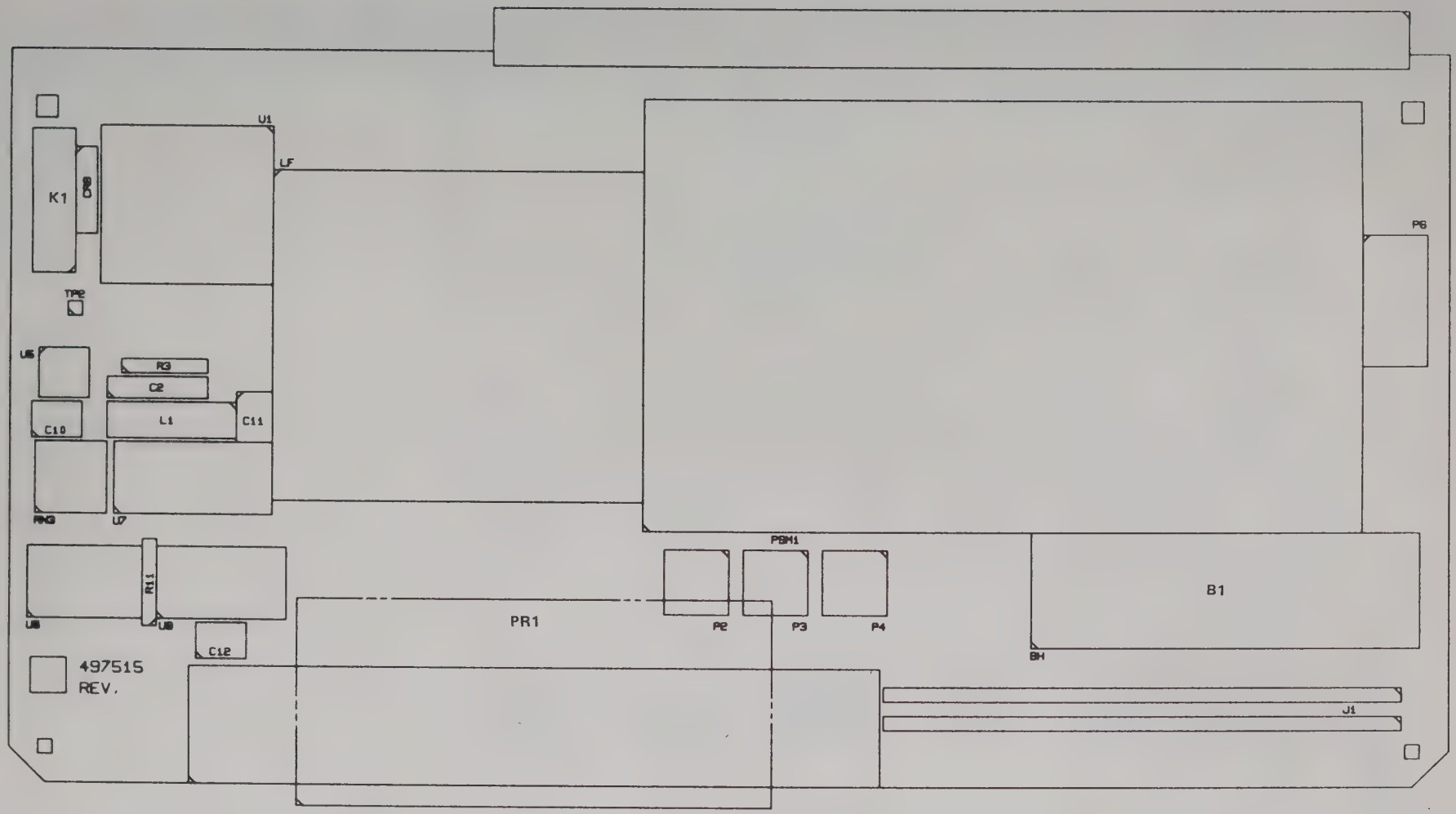
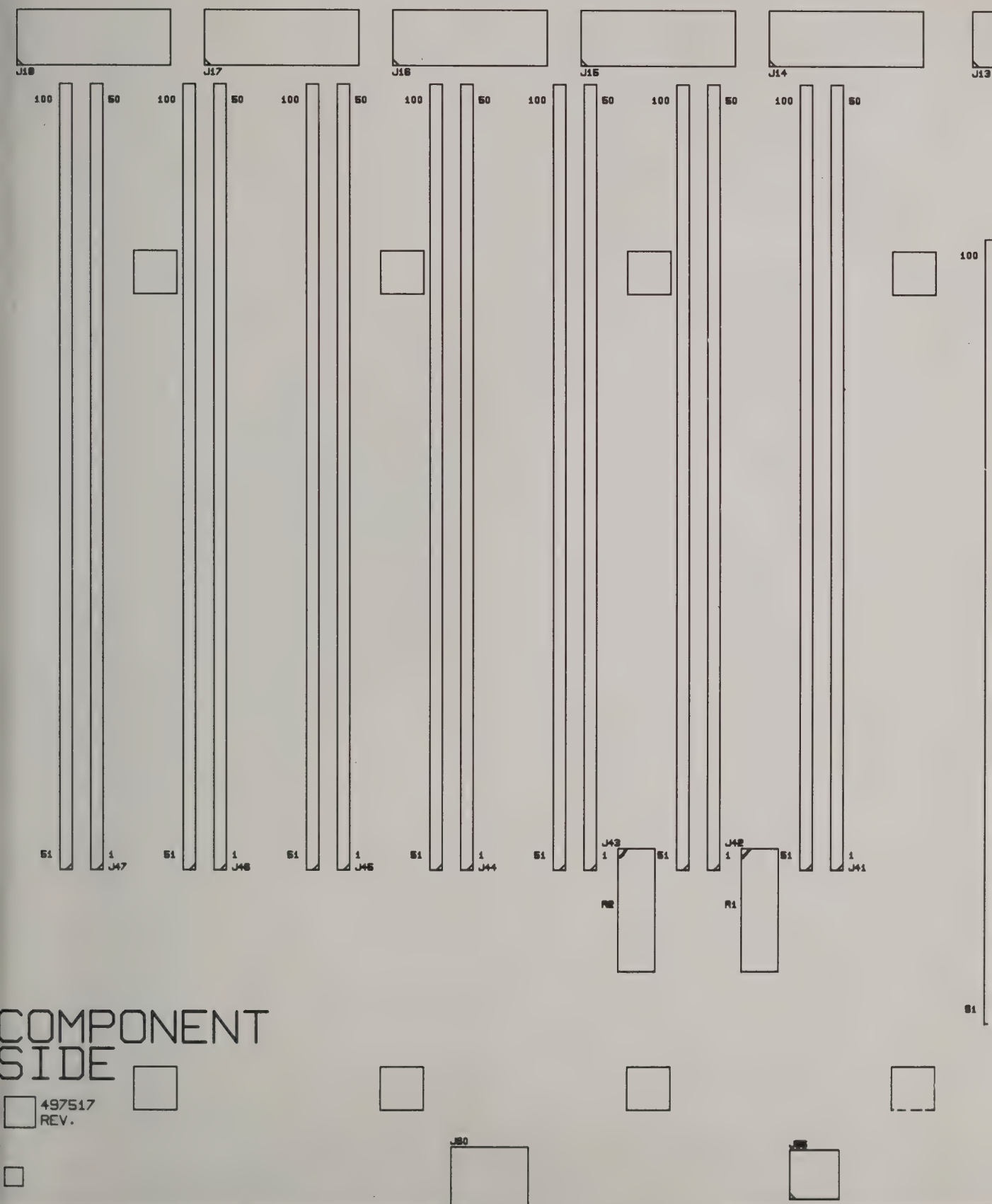


FIG. 4-19 5 VOLT POWER SUPPLY

RS 3600 & RS 3800
PC BOARD ASSY., MOTHER 897517
FIGURE 4-20

DESIGNATION	PART NUMBER	DESCRIPTION
J1	1-292529-40	Connector
		(A-P)
	31-119918-2607	Screw
	243104-5	Washer
	1-216741-401	Lockwasher
	31-119998-26	Nut
		----- * -----
J2-J10	Not Used	
J11-J18	294063-8	Connector
J19,J20	Not Used	
J21-J23	297981-50	Connector
J24-J30	Not Used	
J31	297981-50	Connector
J32-J40	Not Used	
J41-J47	297981-50	Connector
J48-J52	Not Used	
J53	1-292529-60	Connector
		(A-P)
	31-119918-2607	Screw
	243104-5	Washer
	1-216741-401	Lockwasher
	31-119998-26	Nut
		----- * -----
J54,J55	294310-4	Connector
J56-J59	Not Used	
J60	294063-4	Connector
R1,R2	5-115559-100	Resistor 10 Ohms


J18
J17
J16
J15
J14
J13
100
50
51
1
J47
J46
J45
J44
J43
J42
J41
R2
R1
COMPONENT SIDE
497517
REV.
J30

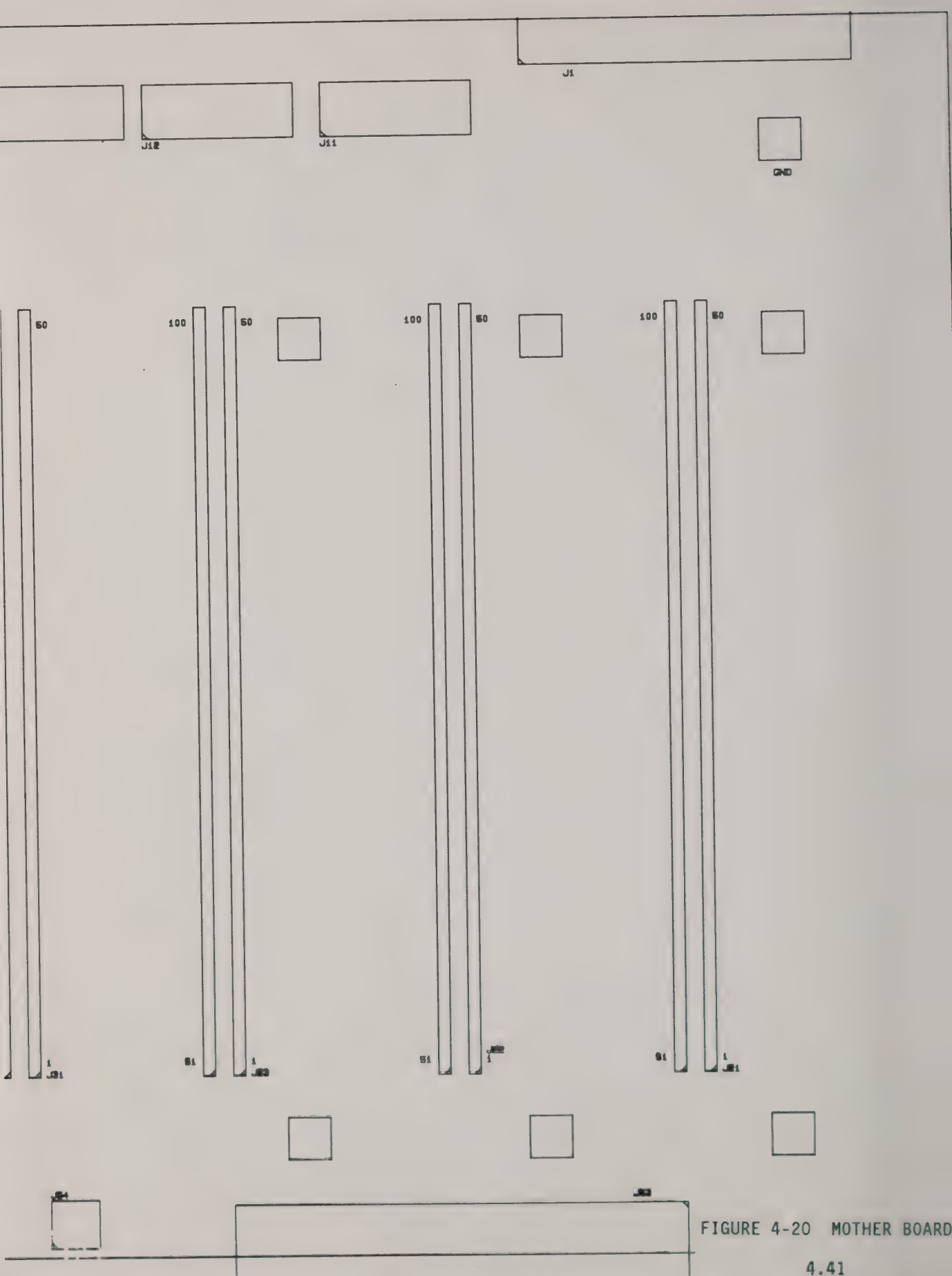


FIGURE 4-20 MOTHER BOARD

RS 3600 & RS 3800
PC BOARD ASSY., CHART SUPPLY SENSOR 897635
FIGURE 4-21

DESIGNATION	PART NUMBER	DESCRIPTION
J1	CL-210228-10	Connector
R1	CL-210099-51R0	Resistor 51 Ohms
R2-R4	CL-210099-1002	Resistor 10K
R5	CL-210099-82R0	Resistor 82 Ohms
R6	CL-210099-1002	Resistor 10K
R7	CL-210099-82R0	Resistor 82 Ohms
U1-U3	298042	Photo Sensor (A-P)
	243104-5	Insulator Washer
		----- * -----
U4	296674-125	I.C. 74HC125
U5,U6	298042	Photo Sensor (A-P)
	243104-5	Insulator Washer
		----- * -----

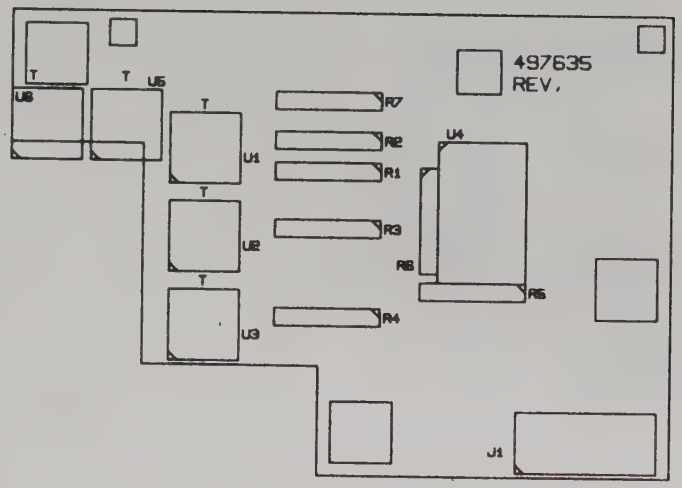


FIG. 4-21 CHART SUPPLY SENSOR BOARD

RS 3600 & RS 3800
PC BOARD ASSY., IRIG INTERFACE 897636
FIGURE 4-22

DESIGNATION	PART NUMBER	DESCRIPTION
C1	10-241145-105	Capacitor 1UF
C2	10-269100-205	Capacitor 2UF
C3	287614-102	Capacitor 1000PF
C4-C18	288755-104	Capacitor 0.1UF
C19-C-21	283943-106	Capacitor 10UF
C22,C23	283943-156	Capacitor 15UF
CR1-CR7	280440	Diode IN4148
J1	294310-2	Connector
J2	292709-16	Connector
P1	296520-1	Shorting Plug
R1-R3	CL-210099-1001	Resistor 1K
R4-47	CL-210099-2001	Resistor 2K
R8	CL-210099-4001	Resistor 4K
R9	CL-210099-5001	Resiistor 5K
R10-R12	CL-210099-1002	Resistor 10K
R13	1-265969-20003	Resistor 2 Meg
R14	5-241111-271	Resistor 270 Ohms
R15	CL-210099-5002	Resistor 50K
R16,R17	Not Used	
R18	5-241111-242	Resistor 2.4K

DESIGNATION	PART NUMBER	DESCRIPTION
R19	5-241111-362	Resistor 3.6K
RN1	2-283274-102	Resistor Network 1K
SW1	1-295641-1	DIP Switch DPST
U1	296674-00	I.C. 74HC00
U2	296674-04	I.C. 74HC04
U3	296674-14	I.C. 74HC14
U4	296674-08	I.C. 74HC08
U5,U6	296674-27	I.C. 74HC27
U7	296674-32	I.C. 74HC32
U8-U10	296674-74	I.C. 74HC74
U11	296674-125	I.C. 74HC125
U12	296674-174	I.C. 74HC174
U13-U15	296674-390	I.C. 74HC390
U16	296674-393	I.C. 74HC393
U17	296674-147	I.C. 74HC147
U18	296378	I.C. RDD104
U19	291062-3	I.C. TL084
U20	296120	I.C. LM319

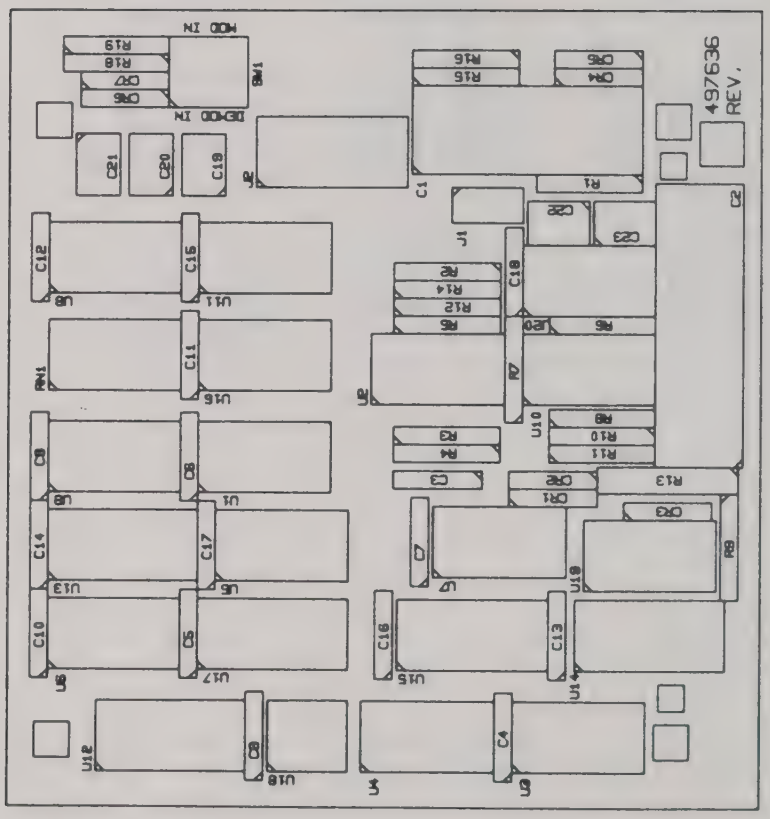


FIG.4-22 IRIG INTERFACE

RS 3600 & RS 3800
PC BOARD ASSY., CONTROLLER 897637
FIGURE 4-23

DESIGNATION	PART NUMBER	DESCRIPTION
C1	283943-476	Capacitor 47UF
C2-C4	240352-200	Capacitor 20PF
C5-C45	288755-103	Capacitor 0.01UF
CR1-CR3	280440	Diode 1N4148
EJ1	290306-1	Ejector White (Not Shown)
EJ2	290306-2	Ejector Red (Not Shown)
J1	Not Used	
J2	296508-37	Connector (A-P)
	31-119918-4005	Screw
	1-216741-411	Lockwasher
	31-129647-40	Nut
		----- * -----
Q1	Not Used	
Q2	286141	Transistor 2N3904
R1	CL-210099-1002	Resistor 10K
R2	Not Used	
R3-R5	CL-210099-1002	Resistor 10K
R6	Not Used	
R7	CL-210099-1002	Resistor 10K
R8	5-241111-472	Resistor 4.7K
R9	5-241111-201	Resistor 200 Ohms
R10,R11	5-241111-472	Resistor 4.7K
SW1	297965-4	DIP Switch
U1	296110	I.C. 6809P
U2	Not Used	
u3	296674-244	I.C. 74HC244
U4	296674-245	I.C. 74HC245
U5,U6	296674-138	I.C. 74HC138
U7	296674-154	I.C. 74HC175
U8	296674-74	I.C. 74HC74
U9	CL-711586-1	I.C. Programmed
U10	297990	I.C. X2004
U11	297978	I.C. 58274
U12	CL-210013	I.C. 8254

DESIGNATION	PART NUMBER	DESCRIPTION
U13	296674-160	I.C. 74HC160
U14,15	296674-00	I.C. 74HC00
U16	296674-02	I.C. 74HC02
U17	296674-10	I.C. 74HC10
U18	Not Used	
U19	296674-273	I.C. 74HC273
U20	289759	I.C. MC1413P
U21	296674-244	I.C. 74HC244
U22	296674-126	I.C. 74HC126
U23	296674-14	I.C. 74HC14
U24	296674-74	I.C. 74HC74
U25	CL-210009	I.C. 7542
U26	296674-21	I.C. 74HC21
U27	296674-244	I.C. 74HC244
U28	296119-2	I.C. LF412
U29	294786-1	I.C. LM393
U30	296674-244	I.C. 74HC244
U31	296674-14	I.C. 74HC14
U32	296674-08	I.C. 74HC08
U33,U34	296378	I.C. RDD104
U35	296674-107	I.C. 74HC107
U36	296674-74	I.C. 74HC74
U37	296674-4020	I.C. 74HC4020
U38	Not Used	
U39	296674-74	I.C. 74HC74
U40	296363-1	I.C. 2KXBRAM
U41	296674-368	I.C. 74HC368
U42	296674-646	I.C. 74HC646
X1	288487-24	Socket 24 pin
X2	288487-28	Socket 28 pin
XU1-XU3	1-283274-102	Resistor Network 1K
XU4	1-283274-472	Resistor Network 4.7K
Y1	296519-1	Crystal 4MHZ

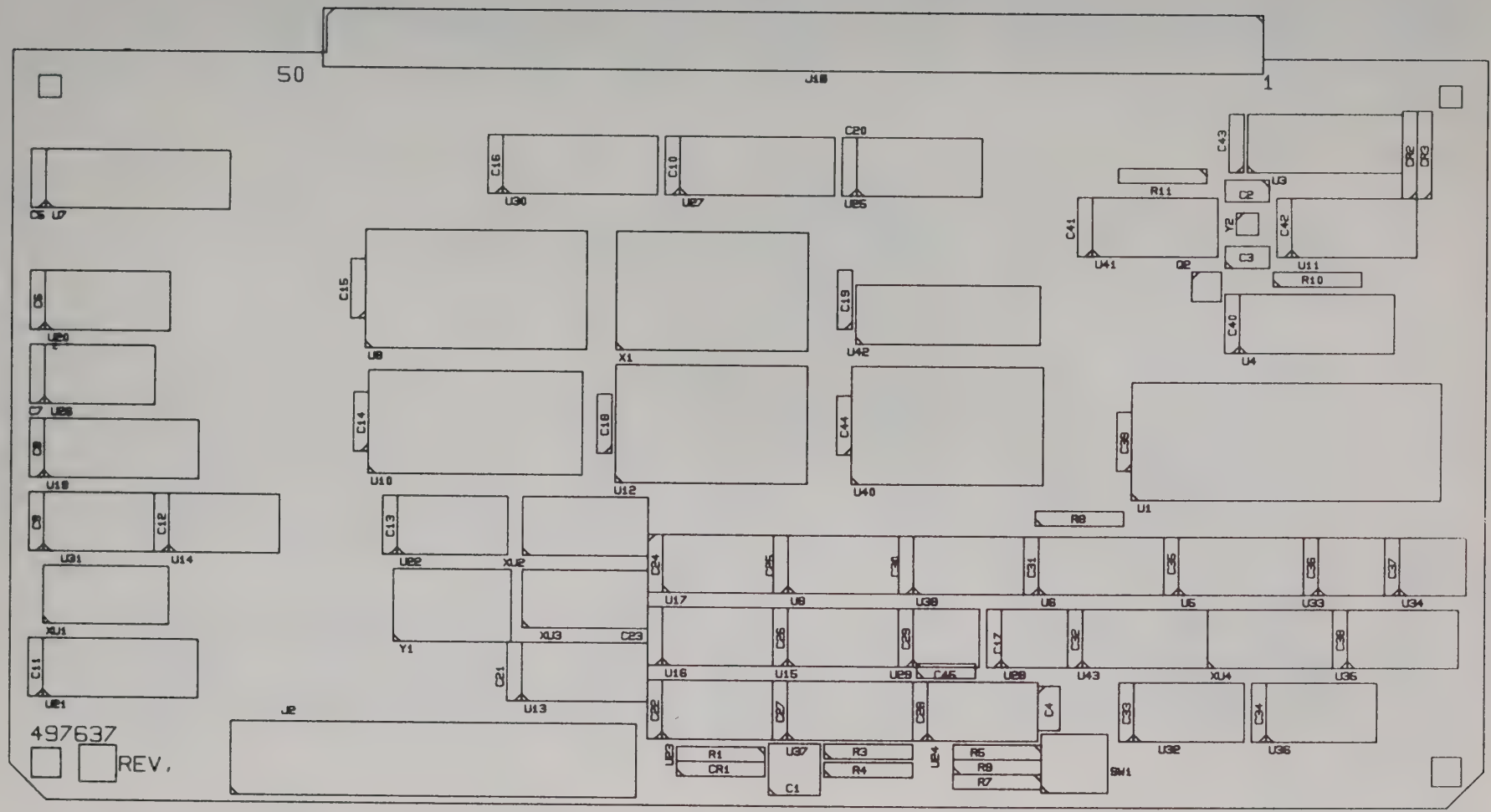


FIG. 4-23 CONTROLLER BOARD

RS 3600 & RS 3800
PC BOARD ASSY., CHART DRIVE 897658
FIGURE 4-24

DESIGNATION	PART NUMBER	DESCRIPTION
C1	10-288757-20	Capacitor 22PF
C2,C3	288755-104	Capacitor 0.1UF
C4,C5	294678-391	Capacitor 390PF
C6	288755-104	Capacitor 0.1MF
C7,C8	28755-102	Capacitor 100PF
C9-C11	Not Used	
C12,C13	283943-106	Capacitor 10UF
C14,C15	263386-108	Capacitor 1000UF
C16-C19	Not Used	
C20-C25	287614-104	Capacitor 0.1UF
C26-C36	287614-104	Capacitor 0.1UF
C37,C38	287614-104	Capacitor 0.1UF
CR1-CR5	280440	Diode 1N4148
CR6-CR13	CL-210393-1	Diode MUR405
EJ1	290306-1	Ejector White (Not Shown)
EJ2	290306-2	Ejector Red (Not Shown)
F1	11619814	Fuse 5 Amp
FC1,FC2	285577	Fuse Clip
L1,L2	CL-210391-2	Inductor 10MH
L3	CL-210391-1	Inductor 100MH
R1,R2	CL-210099-4991	Resistor 4.99K
R3	CL-210099-7501	Resistor 7.5K
R4	CL-210099-2001	Resistor 2K
R5	CL-210099-3001	Resistor 3K
R6,R7	CL-210099-1003	Resistor 100K
R8	Not Used	
R9	CL-210099-1001	Resistor 1K
R10	Not Used	
R11	CL-210099-2001	Resistor 2.2K
R12	CL-210099-3301	Resistor 3.3K
R13	CL-210099-1002	Resistor 10K
R14-R16	Not Used	
R17	CL-210099-4701	Resistor 4.7K
R18	CL-210099-1002	Resistor 10K
R19-R21	Not Used	
R22	CL-210099-2201	Resistor 2.2K
R23	CL-210099-3301	Resistor 3.3K
R24	CL-210099-1002	Resistor 10K
R25	CL-210099-1004	Resistor 1 Meg
R26	CL-210099-1001	Resistor 1K

DESIGNATION	PART NUMBER	DESCRIPTION
R27	293941-203	Poteniometer 20K
R28	CL-210099-4701	Resistor 4.7K
R29	Not Used	
R30	CL-210099-4701	Resistor 4.7K
R31	CL-210099-1002	Resistor 10K
R32-R34	Not Used	
R35	CL-210099-4701	Resistor 4.7K
R36-R42	Not Used	
R43	293941-502	Poteniometer 5K
R44	CL-210099-6001	Resistor 6K
R45-R48	Not Used	
R49,R50	1-130340-0R1	Resistor 0.1 Ohm
R51-R54	Not Used	
R55	CL-210099-2003	Resistor 200K
R56,R57	CL-21099-1002	Resistor 10K
R58	CL-210099-2003	Resistor 200K
R59-R61	CL-210099-1002	Resistor 10K
RN1,RN2	296511-103	SIP Resistor Network 10K
RN3,RN4	3-283274-101	DIP Resistor Network 100 Ohms
RN5	3-283274-472	DIP Resistor Network 10K
RN6-RN8	3-283274-104	DIP Resistor Network 10K
RN9,RN10	297492	DIP Resistor Network 10K
TP1-TP6	265763-3	Contact
U1-U4	296674-541	I.C. 74HC541
U5	296674-32	I.C. 74HC32
U6	296674-139	I.C. 74HC139
U7	296674-04	I.C. 74HC04
U8	296674-125	I.C. 74HC125
U9	296674-74	I.C. 74HC74
U10	CL-210009	I.C. AD7542
U11	291952	I.C. OP-07BI
U12	296275-1	I.C. LF411ACN
U13	CL-210013	I.C. 8254
U14	296674-393	I.C. 74HC393
U15	CL-611024	I.C. Programmed

DESIGNATION	PART NUMBER	DESCRIPTION
U16	296678	I.C. Voltage Ref LH0070
U17	296674-74	I.C. 74HC74
U18	291062-3	I.C. TL084CN
U19,U20	CL-611025	I.C. Programmed
U21,U22	293085	I.C. AD7524
U23	Not Used	
U24	296674-393	I.C. 74HC393
U25	Not Used	
U26	296674-74	I.C. 74HC74
U27	296674-86	I.C. 74HC86
U28	290169-26	I.C. 74LS26
U29,U30	296674-273	I.C. 74HC273
U31,U32	Not Used	
U33	286146	I.C. LM339N
U34	Not Used	
U35	291062-3	I.C. TL084CN
U36	Not Used	
U37	293086	I.C. LM331AN
U38	291062-3	I.C. TL084CN
U39,U40	293093	Transistor Array MPQ3906
U41	Not Used	
U42,U44	293094	Transistor Array MPQ3906
U45,U46	CL-210381	I.C. IRFT-003 (A-P)
	CL-210726	Heat Sink
	293848-10	Insulator
	31-119918-2606	Screw
	1-120052-201	Lockwasher
	31-119998-26	Nut
		----- * -----
U47	290169-26	I.C. 74LS26
U48	285317	I.C. Voltage Reg 7805 (A-P)
	293324-1	Heat Sink
	293848-3	Insulator
	31-119918-4006	Screw
	1-216741-410	Lockwasher
	31-119998-40	Nut
		----- * -----
XU1	292709-24	Socket 24 pin
XU2,XU3	292709-16	Socket 16 pin
XU4	292709-20	Socket 20 pin

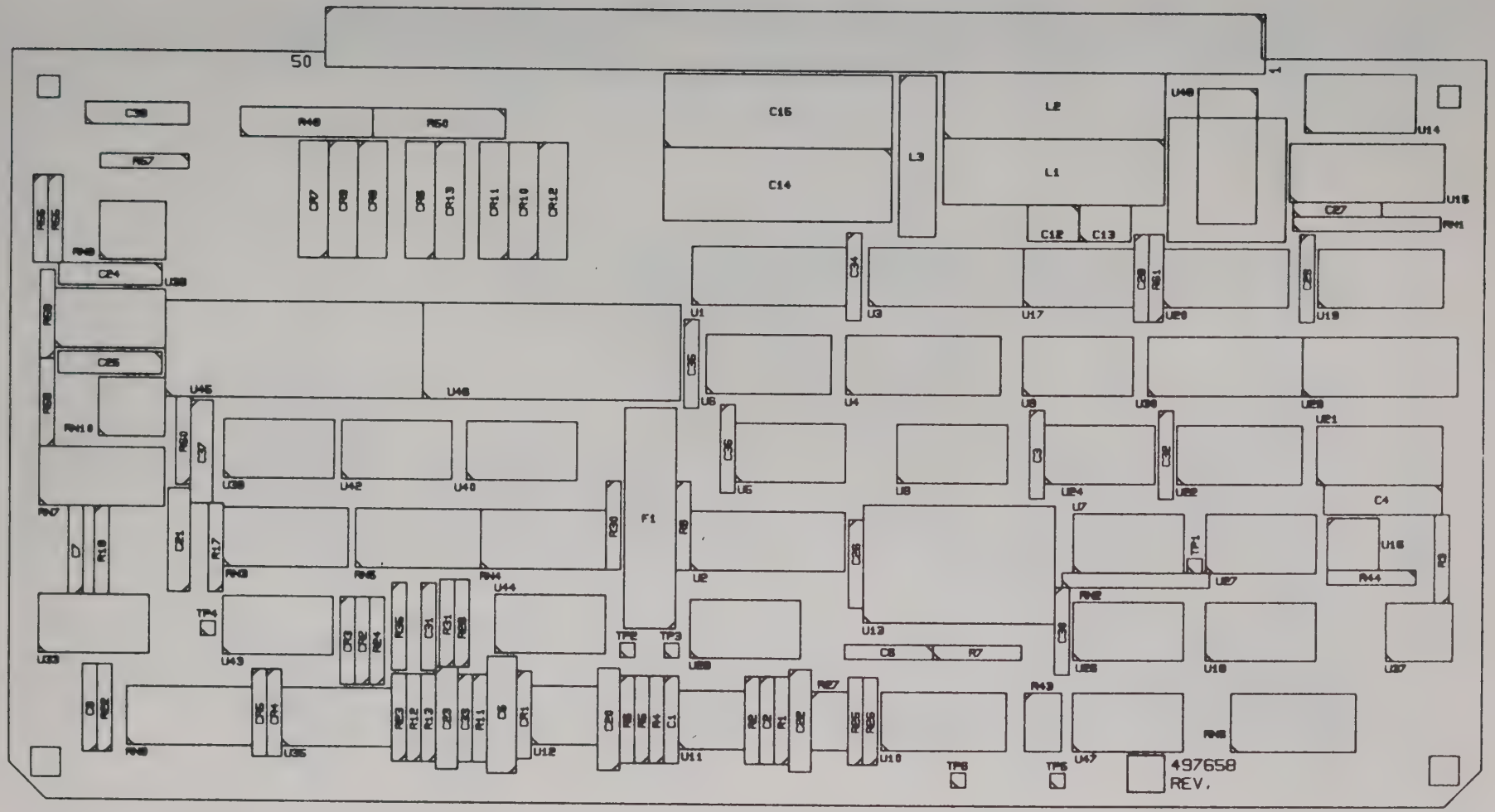


FIG. 4-24 CHART DRIVE BOARD

RS 3600 & RS 3800
PC BOARD ASSY., IEEE-488 INTERFACE 897727
FIGURE 4-25

DESIGNATION	PART NUMBER	DESCRIPTION
C1-C2	Not Used	
C3	288755-104	Capacitor 0.1UF
C4	Not Used	
C5	288755-104	Capacitor 0.1UF
C6	Not Used	
C7	288755-104	Capacitor 0.1uf
C8	Not Used	
C9	288755-104	Capacitor 0.1UF
C10	Not Used	
C11	288755-104	Capacitor 0.1UF
C12-C15	Not Used	
C16	288755-104	Capacitor 0.1UF
C17	Not Used	
C18	288755-104	Capacitor 0.1UF
C19	Not Used	
C20,C21	28755-104	Capacitor 0.1UF
C22-C25	Not Used	
C26-C28	28755-104	Capacitor 0.1UF
C29-C39	Not Used	
C40	283943-106	Capacitor 10UF
EJ1	290306-1	Ejector White (Not Shown)
EJ2	290306-2	Ejector Red (Not Shown)
J1	CL-210286	Connector (A-P)
	31-119918-4005	Screw
		----- * -----
J2	296509-37	Connector (A-P)
	31-119918-4005	Screw
	1-216741-411	Lockwasher
	31-129647-40	Nut
		----- * -----
J3	298040	BNC Connector
RP1	3-283274-102	Resistor Network 1K
RP2	4-283274-103	Resistor Network 10K
RP3	2-283274-102	Resistor Network 1K
SW1	286142-8	DIP Switch

DESIGNATION	PART NUMBER	DESCRIPTION
SW2	Not Used	
SW3	286142-3	DIP Switch
U1	296110	I.C. 6809P
U2	292139	I.C. 8255A
U3	Not Used	
U4	296674-244	I.C. 74HC244
U5	Not Used	
U6	296363-1	I.C. 6516
U7	CL-611652-01	I.C. Programmed
U8	296674-154	I.C. 74HC154
U9	296674-139	I.C. 74HC139
U10	296674-244	I.C. 74HC244
U11	Not Used	
U12	296109	I.C. 8291A
U13-U16	296111	I.C. 344B
U17	Not Used	
U18	296674-126	I.C. 74HC126
U19	Not Used	
U20	296674-11	I.C. 74HC11
U21	296674-00	I.C. 74HC00
U22,U23	296674-04	I.C. 74HC04
X1-X14	Not Used	
X15	288487-24	Socket 24 pin
X16-X23	Not Used	
X24	288487-24	Socket 24 pin
X25	285593-16	Socket 16 pin

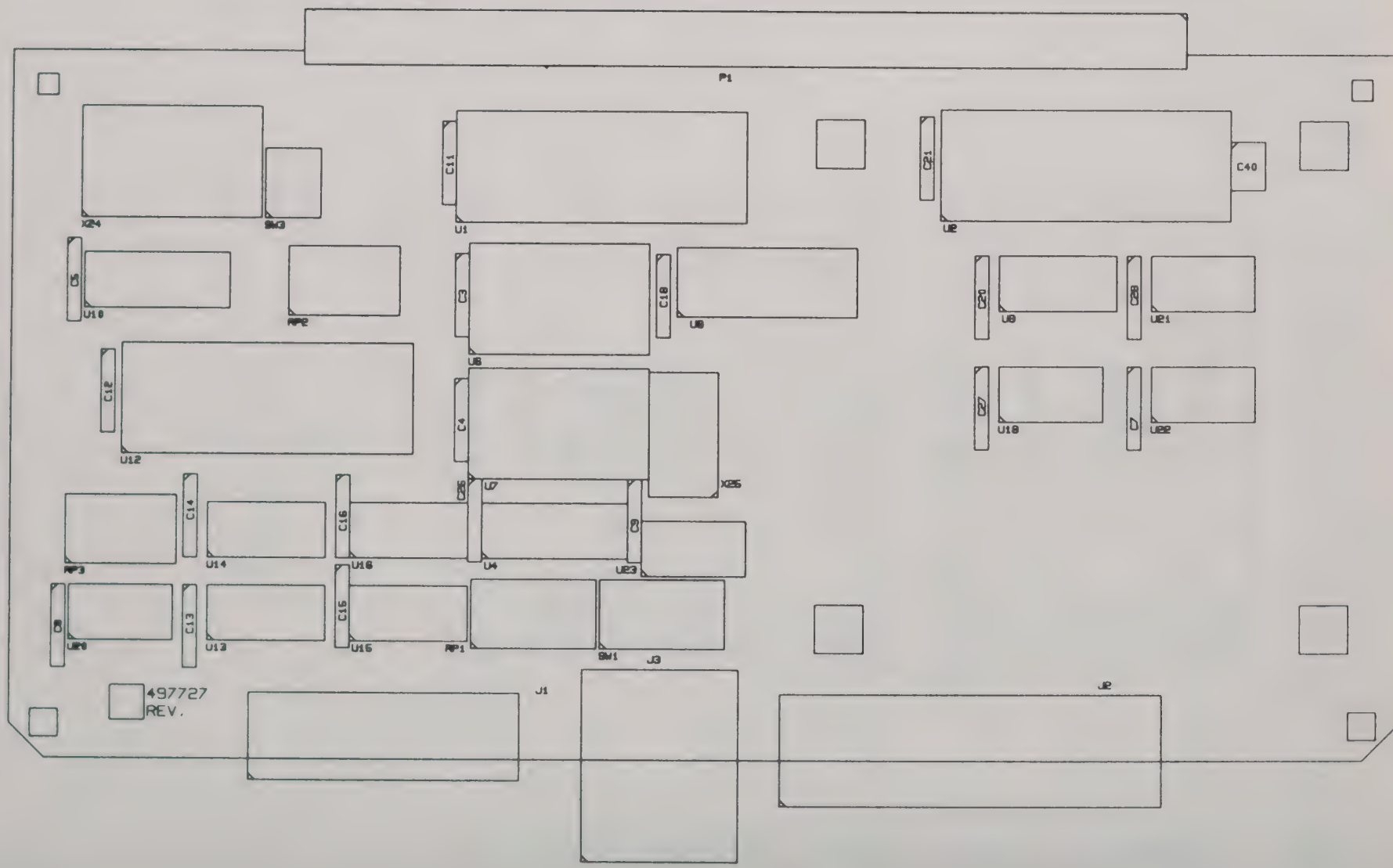


FIG. 4-25 IEEE-488 INTERFACE

RS 3600 & RS 3800
PC BOARD ASSY., RS-232 INTERFACE 897728
FIGURE 4-26

DESIGNATION	PART NUMBER	DESCRIPTION
C1	Not Used	
C2-C5	288755-104	Capacitor 0.1UF
C6	Not Used	
C7-C11	288755-104	Capacitor 0.1UF
C12-C17	Not Used	
C18	288755-104	Capacitor 0.1UF
C19	Not Used	
C20-C22	288755-104	Capacitor 0.1UF
C23-C25	Not Used	
C26-C28	288755-104	Capacitor 0.1UF
C29-C39	Not Used	
C40	283943-106	Capacitor 10UF
C41-C49	Not Used	
C50	240352-300	Capacitor 30PF
EJ1	290306-1	Ejector White (Not Shown)
EJ2	290306-2	Ejector Red (Not Shown)
J1	296509-25	Connector (A-P)
	31-119918-4005	Screw
	1-216741-411	Lockwasher
	31-129647-40	Nut
		----- * -----
J2	296509-37	Connector (A-P)
	31-119918-4005	Screw
	1-216741-411	Lockwasher
	31-129647-40	Nut
		----- * -----
J3	298040	BNC Connector
RP1	3-283274-102	Resistor Network 1K
RP2	4-283274-103	Resistor Network 10K
RP3	2-283274-102	Resistor Network 1K
SW1	286142-8	DIP Switch
SW2	1-195641-1	Switch DPST
SW3	286142-3	DIP Switch

DESIGNATION	PART NUMBER	DESCRIPTION
U1	296110	I.C. 6809P
U2	292139	I.C. 82554
U3	Not Used	
U4	296674-244	I.C. 74HC244
U5	Not Used	
U6	296363-1	I.C. 6516
U7	CL-611651-02	I.C. Programmed
U8	296674-154	I.C. 74HC154
U9	296674-139	i.c. 74HC139
U10-U17	Not Used	
U18	296674-126	I.C. 74HC126
U19	Not Used	
U20	296674-11	I.C. 74HC11
U21	296674-00	I.C. 74HC00
U22	290169-04	I.C. 74LS04
U23	296674-04	I.C. 74HC04
U24,U25	Not Used	
U26	295654	I.C. 1488
U27	295653	I.C. 1489
U28,U29	Not Used	
U30	CL-210010	I.C. 65C51
X1-X6	Not Used	
X7	288487-24	Socket 24 pin
X8-X23	Not Used	
X24	288487-24	Socket 24 pin
X25	285593-16	Socket 16 pin
Y1	289053-14	Crystal 1.8432MHZ

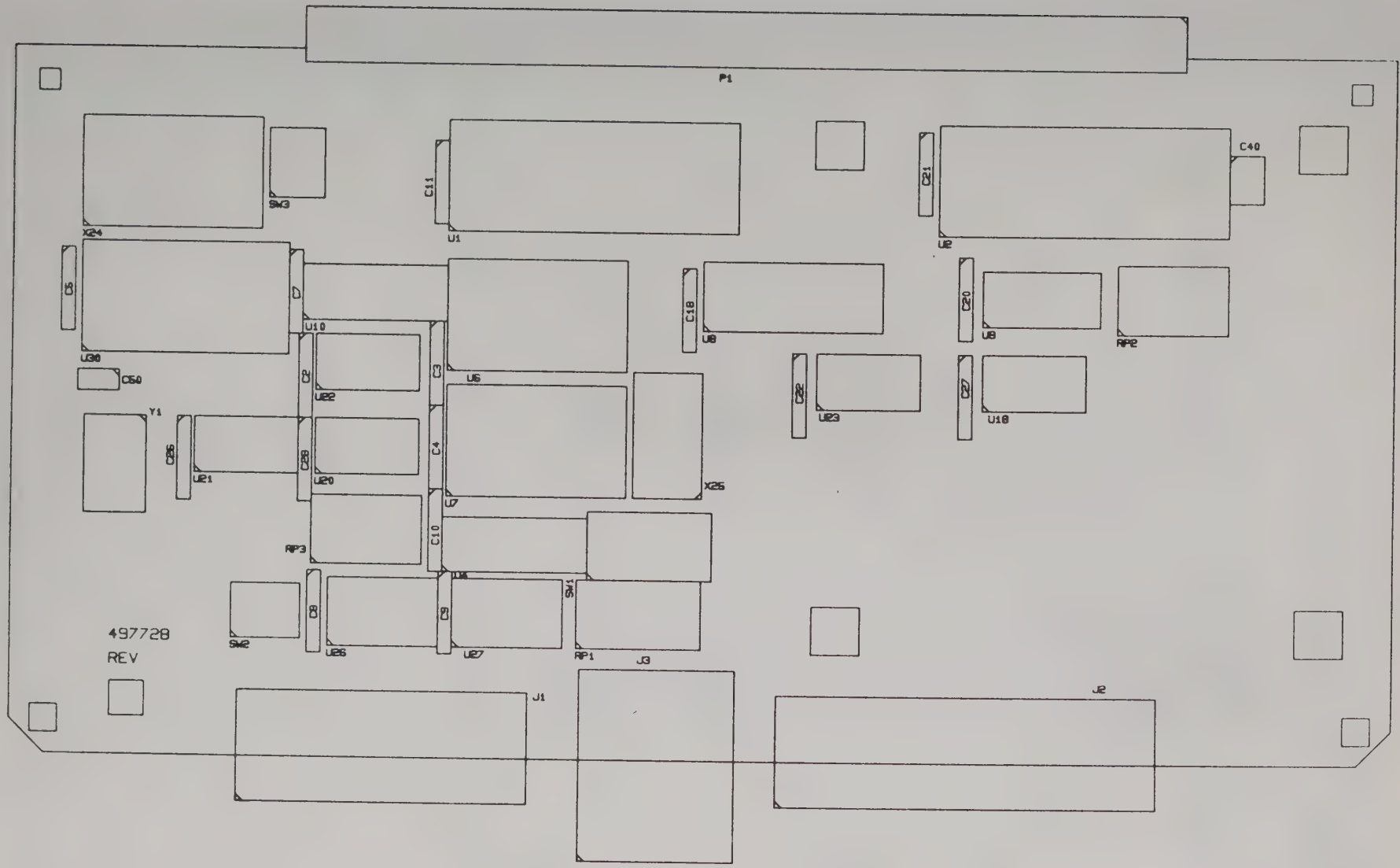
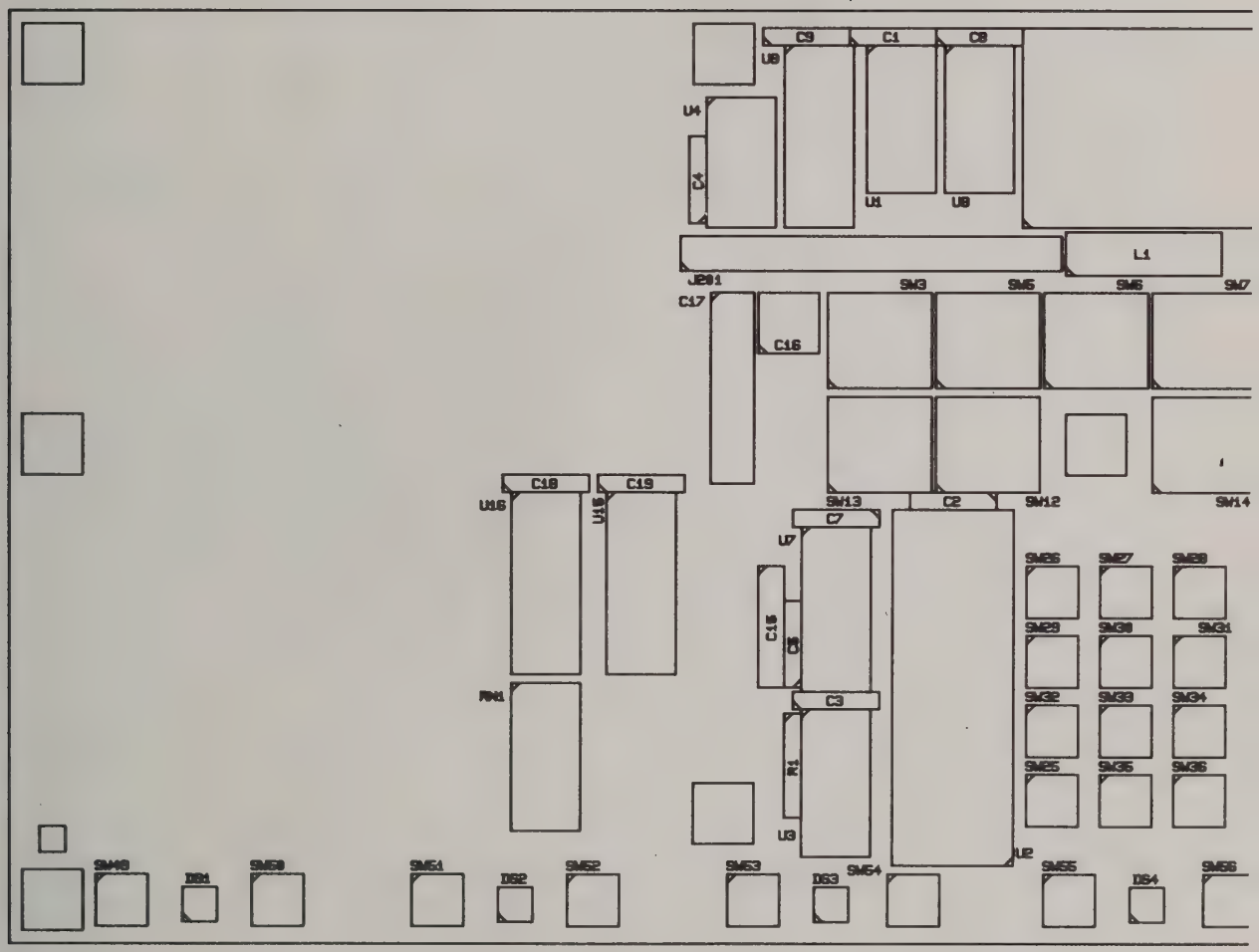


FIG. 4-26 RS-232 INTERFACE

RS 3600 & RS 3800
PC BOARD ASSY., 8 CH. KEYBOARD 897783
FIGURE 4-27

DESIGNATION	PART NUMBER	DESCRIPTION
C1-C5	288755-104	Capacitor 0.1UF
C6	Not Used	
C7-C14	288755-104	Capacitor 0.1UF
C15	10-263695-105	Capacitor 1.0UF
C16	283943-156	Capacitor 15UF
C17	295462-685	Capacitor 6.8UF
C18,C19	288755-104	Capacitor 0.1UF
J101	Not Used	
J102	CL-710329	Cable Assembly
L1	291224-1	Inducter 8.2UH
R1	CL-210099-1001	Resistor
SW1-SW16	CL-210198	Switch B3F-4155
SW17-SW47	297909-2	Switch B3F-1152
SW48	Not Used	
SW49-SW64	297909-2	Switch B3F-1152
U1	296674-138	I.C. 74HC138
U2	CL-210194	I.C. 8279
U3	296674-138	I.C. 74HC138
U4	296674-32	I.C. 74HC32
U5,U6	Not Used	
U7	CL-210195	I.C. 74HC922
U8	296674-368	I.C. 74HC368
U9	296674-244	I.C. 74HC244
U10-U14	CL-210193	I.C. 75512
U15,U16	Not Used	
VFD	CL-210199	Vacuum Fluorescent Display DC164A2


C9
C1
C8
U9
U4
C4
U1
U8
L1
J201
C17
C16
SW3
SW5
SW6
SW7
C18
C19
U16
U15
SW13
C2
SW12
SW14
C7
U7
SW26
SW27
SW28
C15
C5
SW29
SW30
SW31
RN1
C3
SW32
SW33
SW34
R1
SW25
SW35
SW36
U3
U2
SW49
DS1
SW50
SW51
DS2
SW52
SW53
DS3
SW54
SW55
DS4
SW56

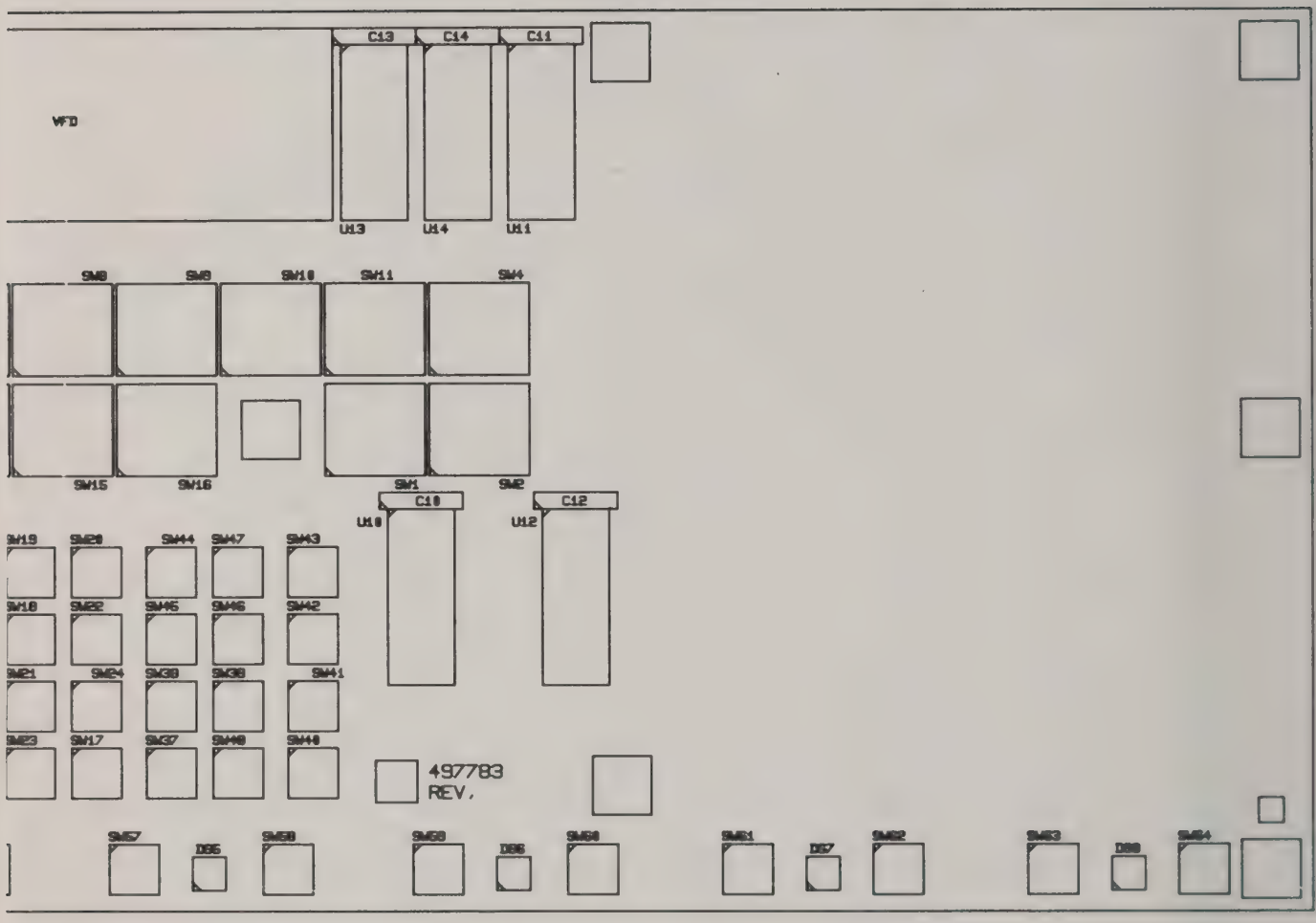
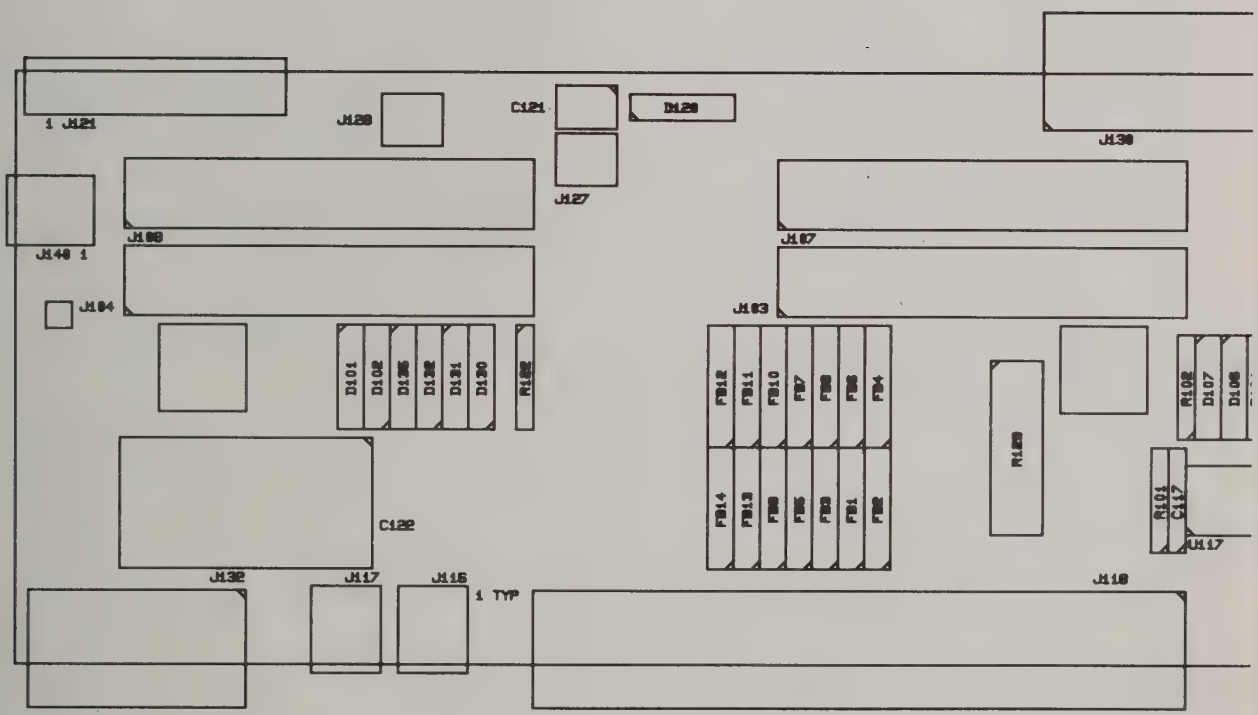


FIGURE 4-27 8 CH. KEYBOARD BOARD

RS 3600 & RS 3800
PC BOARD ASSY., MOTHER-IN-LAW 897813-1
FIGURE 4-28

DESIGNATION	PART NUMBER	DESCRIPTION
C101-C110	Not Used	
C111-C119	288755-104	Capacitor 0.1UF
C120,C121	283943-107	Capacitor 100UF
C122	263386-108	Capacitor 1000UF
C123,C124	288755-104	Capacitor 0.1UF
C125	10-288757-221	Capacitor 220PF
D101	269256-7	Diode 1N4007
D102-D120	296616	Diode 1N5818
D121-D129	Not Used	
D130-D136	269256-7	Diode 1N4007
D137	5-244922-20	17V Zener Dioode
FB1-FB14	297712	Ferrite Bead
J101-J108	292715-15	Connector
J109	294310-4	Connector
J110	Not Used	
J111-J117	294310-4	Connector
J118	1-292529-60	Connector
J119,J120	Not Used	
J121	297976-13	Connector
J122-J125	Not Used	
J126-J129	270270-1	Terminal (A-P)
	16-107283-5	Rivet
		----- * -----
J130	1-292529-40	Connector
J131	Not Used	
J132	1-292529-10	Connector
J133-J139	Not Used	
J140	294310-4	Connector
Q101,Q102	CL-211006	Transistor (A-P)
	293848-3	Insulator
	293324-1	Heat Sink
	31-119918-4006	Screw
	1-216741-410	Washer
	31-119998-40	Nut
		----- * -----

DESIGNATION	PART NUMBER	DESCRIPTION
R101-R114	CL-210099-1002	Resistor 10K
R115-R119	Not Used	
R120,R121	CL-210099-2000	Resistor 200 Ohms
R122	CL-210099-1001	Resistor 1K
R123-R127	Not Used	
R128,R129	5-115558-100	Resistor 10 Ohms
R130,R131	CL-210099-1002	Resistor 10K
R132	CL-210099-2204	Resistor 2.2 Meg
R133	CL-210099-3000	Resistor 300 Ohms
U111-U117	CL-211012	I.C. 75473
U118	296512	I.C. 75472
U119	Not Used	
U120	296512	I.C. 75472
U121	296674-123	I.C. 74HC123


1 J121
J120
C121
D120
J127
J130
J140 1
J108
J107
J104
J103
D101
D102
D131
D132
D131
D130
R122
FB12
FB11
FB10
FB7
FB8
FB9
FB4
FB14
FB13
FB6
FB5
FB3
FB1
FB2
R123
R102
D107
D106
R101
C117
J117
C122
J132
J117
J115
1 TYP
J118

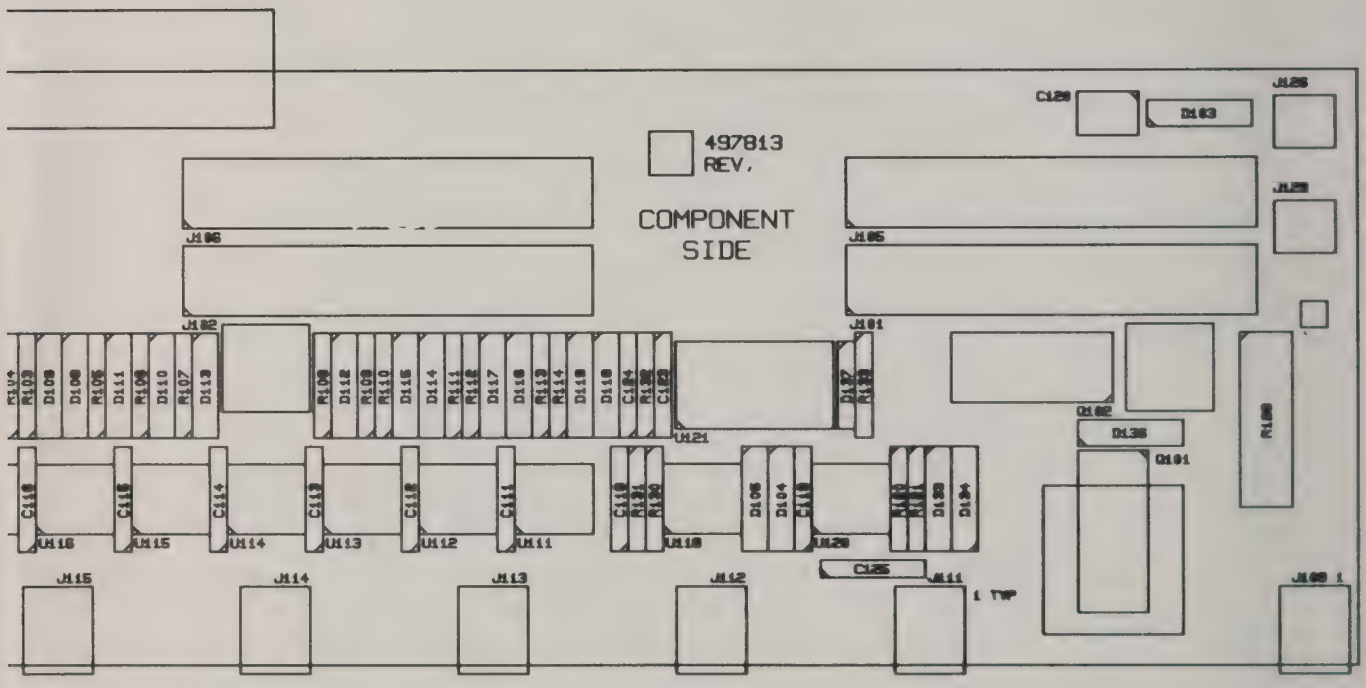
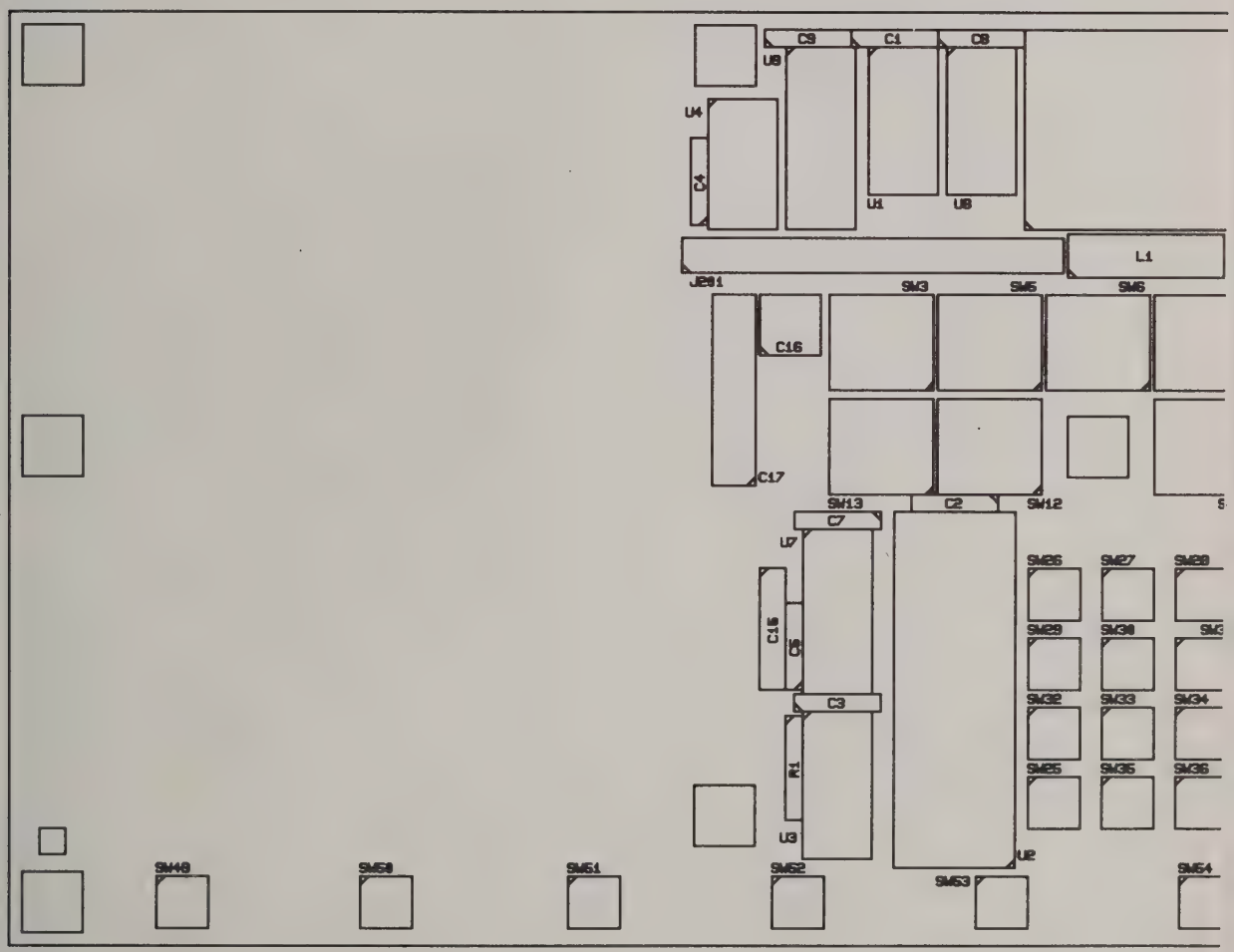


FIGURE 4-28 MOTHER-IN-LAW BOARD

RS 3600 & RS 3800
PC BOARD ASSY., 6 CH. KEYBOARD CL-810186
FIGURE 4-29

DESIGNATION	PART NUMBER	DESCRIPTION
C1-C5	288755-104	Capacitor 0.1UF
C6	Not Used	
C7-C14	288755-104	Capacitor 0.1UF
C15	10-263695-105	Capacitor 1.0UF
C16	283943-156	Capacitor 15UF
C17	295462-085	Capacitor 6.8 UF
J101	Not Used	
J102	CL-710329	Cable Assembly
L1	291244-1	Inductor 8.2UH
R1	CL-210098-1001	Resistor 1K
SW1-SW16	CL-210198	Switch B3F-4155
SW17-SW47	297909-2	Switch B3F-1152
SW48	Not Used	
SW49-SW60	297909-2	Switch B3F-1152
U1	296674-138	I.C. 74HC138
U2	CL-210194	I.C. 8279
U3	296674-138	I.C. 74HC138
U4	296674-32	I.C. 74HC32
U5,U6	Not Used	
U7	CL-210195	I.C. 74C922
U8	296674-368	I.C. 74HC368
U9	296674-244	I.C. 74HC244
U10-U14	CL-210193	I.C. 75512
VFD	CL-210199	Vacuum Fluorescent Display DC164A2


C9
C1
C8
U9
U4
C4
U1
U8
L1
J291
SW3
SW5
SW6
C16
C17
SW13
C2
SW12
C7
U7
C15
C5
C3
R1
U3
U2
SW26
SW27
SW28
SW29
SW30
SW32
SW33
SW34
SW25
SW35
SW36
SW49
SW50
SW51
SW52
SW53
SW54

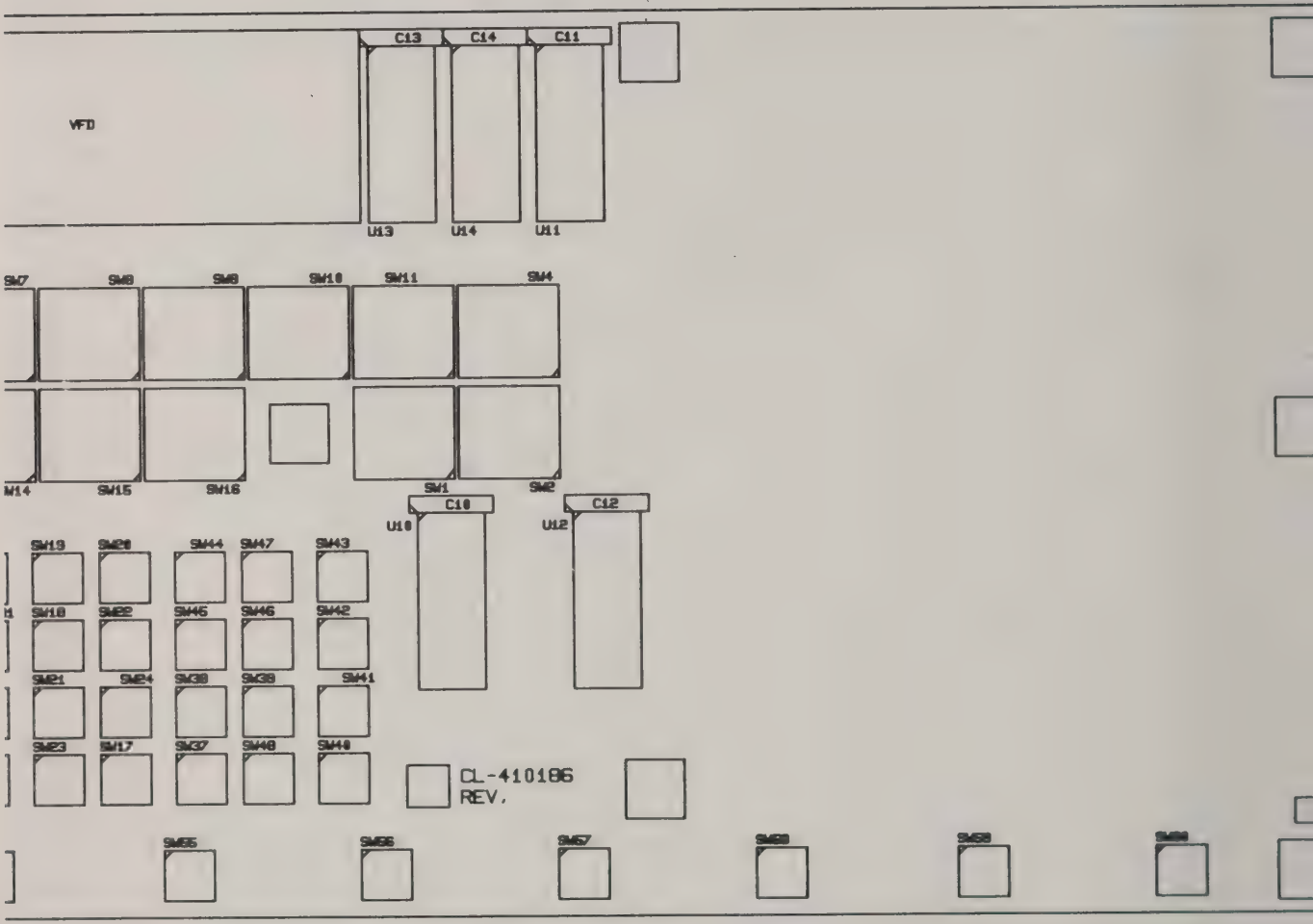


FIGURE 4-29 6 CH. KEYBOARD BOARD

RS 3600 & RS 3800
PC BOARD ASSY., INTERCHANNEL ANNOTATION DRIVER CL-810191
FIGURE 4-30

DESIGNATION	PART NUMBER	DESCRIPTION
C1-C3	288755-103	Capacitor 0.01UF
C4	294666-227	Capacitor 220UF
CR1	269256-7	Diode 1N4007
CR2-CR5	296616	Diode 1N5818
CR6-CR8	2692567	Diode 1N4007
J1,J2	297976-13	Connector
U1,U2	296674-273	I.C. 74HC273
U3,U4	289759	I.C. ULN2003
U5	296674-138	I.C. 74HC138
	249438-13	Spacer

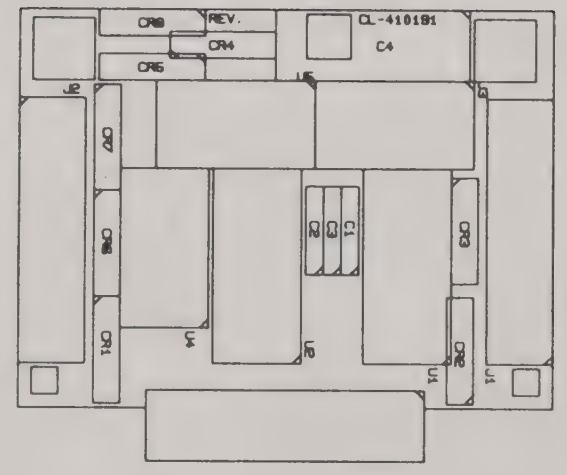


FIGURE 4.30
INTERCHANNEL ANNOTATION DR. BD.

RS 3600 & RS 3800
PC BOARD ASSY., PAPER OUT SENSOR CL-810240
FIGURE 4-31

DESIGNATION	PART NUMBER	DESCRIPTION
J1	294310-6	Connector Right Angle
Q1	281702-2	Transistor 2N4401
R1	CL-210099-1002	Resistor 10K
U1	298042	Sensor (A-P)
	243104-5	Insulator Washer
		----- * -----
	247155-40	Clinch Nut

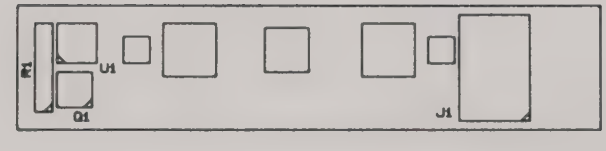


FIG. 4-31 PAPER OUT SENSOR

RS 3600 & RS 3800
PC BOARD ASSY., SPEED MONITOR CL-810290
FIGURE 4-32

DESIGNATION	PART NUMBER	DESCRIPTION
J1	294310-4	Connector Right Angle
R1	CL-210099-2200	Resistor 220 Ohms
U1	CL-210335-1	Photo Sensor/Emitter

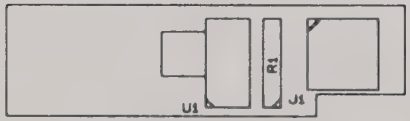


FIG. 4-32 SPEED MONITOR BOARD

3800 & 3600 INK RECORDER
MOBILE CART ASSY., 11-6405-05
FIGURE 4-33

ITEM NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	USED ON
1	11-6405-05	Cart Assy., Mobile	
2	CL-211649	Strap, Buckled	
3	244905	Caster, Swivel	

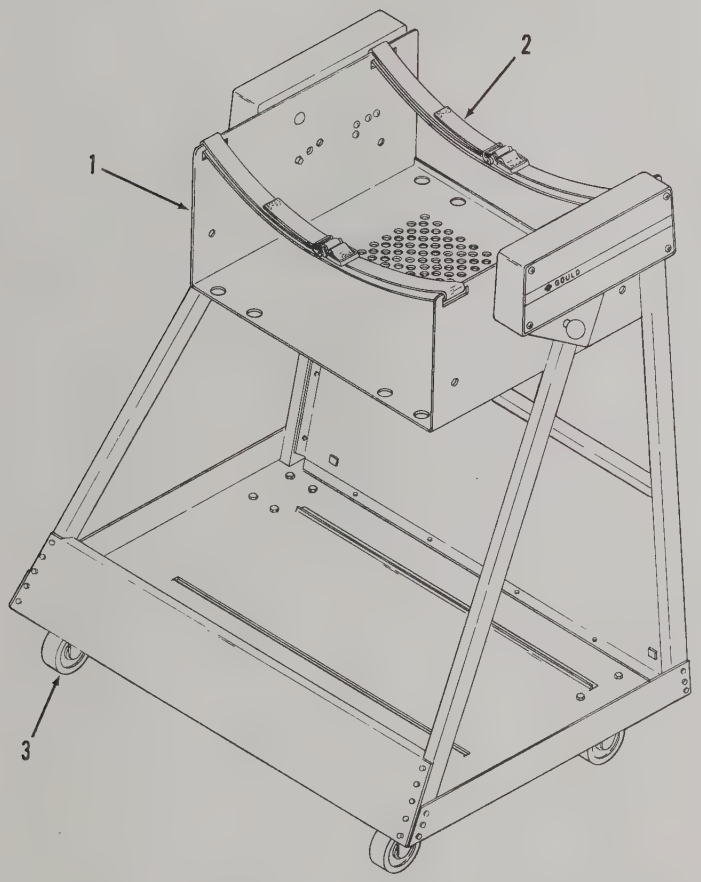


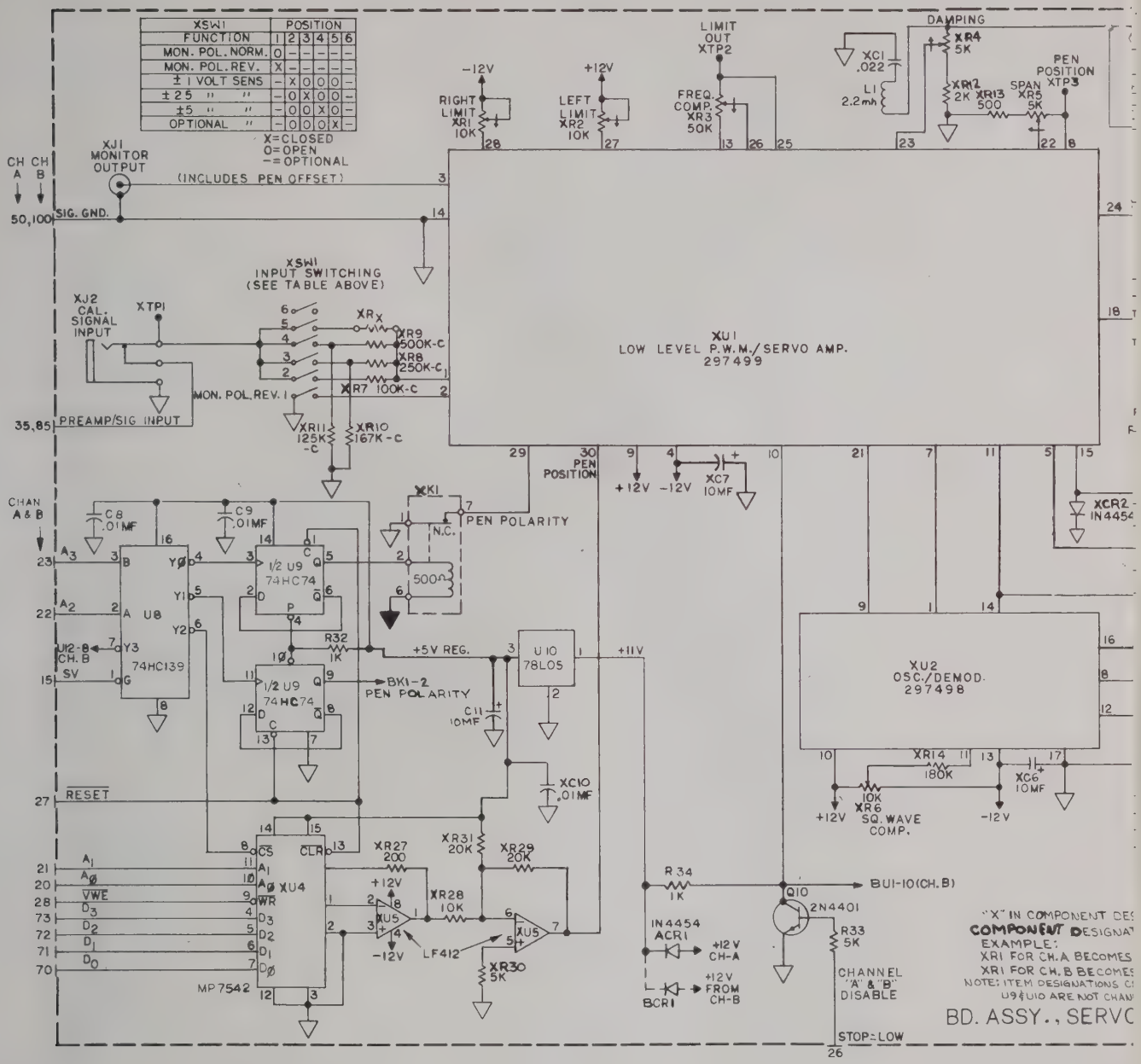
FIGURE 4-33 MOBILE CART

APPENDIX A

SCHEMATIC DIAGRAMS

Listed below are the schematic diagrams which apply to RS 3600 and RS 3800 ink recorders. The schematics follow this page in the order which they are listed. The PC board assembly number and the corresponding schematic number have the same basic number in common. The assembly number begins with a 8 and the schematic number with a 2.

Schematic Number	Rev Level	Description
297406	K	Servo Drive Bd.
297515	J	5 volt Power Supply Bd.
297517	G	Mother Bd.
297635	E	Chart Supply Sensor Bd.
297636	E	IRIG Interface Bd.
297637	S	Controller Bd.
297658	F	Chart Drive Bd.
297727	H	IEEE-488 Interface Bd.
297728	H	RS-232 Interface Bd.
297783	G	8 Ch. Keyboard Bd.
297813	J	Mother-in-Law Bd.
297912	A	Photo Sensor Cable Assy.
CL-210186	F	6 CH. Keyboard Bd.
CL-210191	E	Interchannel Annotation Driver Bd.
CL-210240	G	Paper Out Sensor Bd.
CL-210290	-	Speed Monitor Bd.
CL-210466	D	Voltage Selector Bd.
CL-211529	-	Overall Schematic 8 Ch.
CL-211531	-	Overall Schematic 6 Ch.
384919	J	Power Kit
393130	H	Power Kit



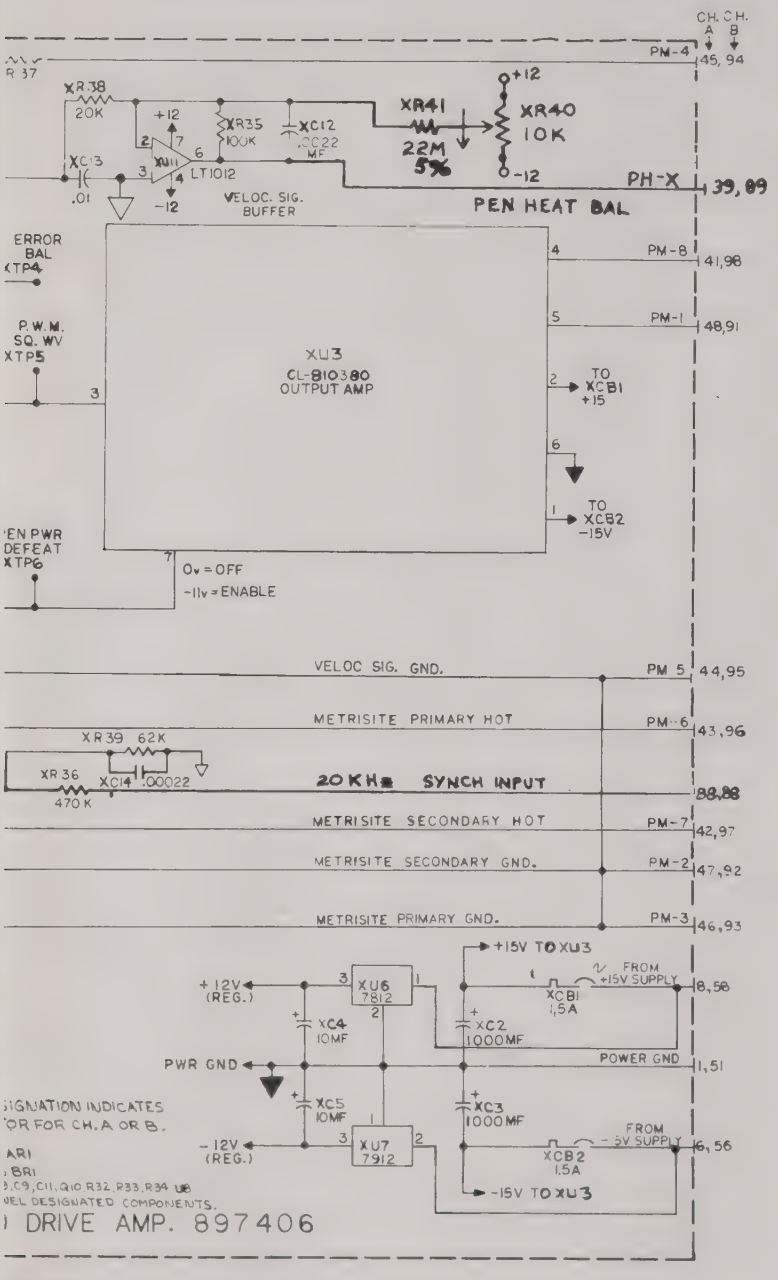
3. CONNECTIONS PM-1 THRU PM-8 REFER TO PEN MOTOR TERMINALS 1 THRU 8.

2. UNLESS OTHERWISE INDICATED:
ALL CAPACITANCE IN MICROFRADS
ALL RESISTANCE IN OHMS.
ALL RESISTORS 1/4 W, 1%
TOLERANCE C=.25%

1. SIG. GND. ⏚ IS TIED TO PWR GND ▼ VIA BACKPLANE CONNECTOR PINS 1, 50, 51 & 100
NOTES:

I.C.	+
297499	
297498	
CL-810380	
MP7542	1
LF412	
74HC139	1
74HC74	1
LT1012	
7812	
7912	

REVISIONS		
SYM.	DESCRIPTION	DATE
K	NOT AFFECTED DCN 34002 CLARK	3-27-87



POWER / GROUND PIN CHART

5V	GND.	+15V	-15V	+12V	-12V	SYMBOL
	14, 5			9	4	XU1
	14, 12			10	13	XU2
	6	2	1			XU3
1	12					XU4
				8	4	XU5
	8					U8
	7					U9
				7	4	XU1
	2	1				U6
	1		2			U7

BOARD ASSY, SERVO DRIVE AMP. 897406

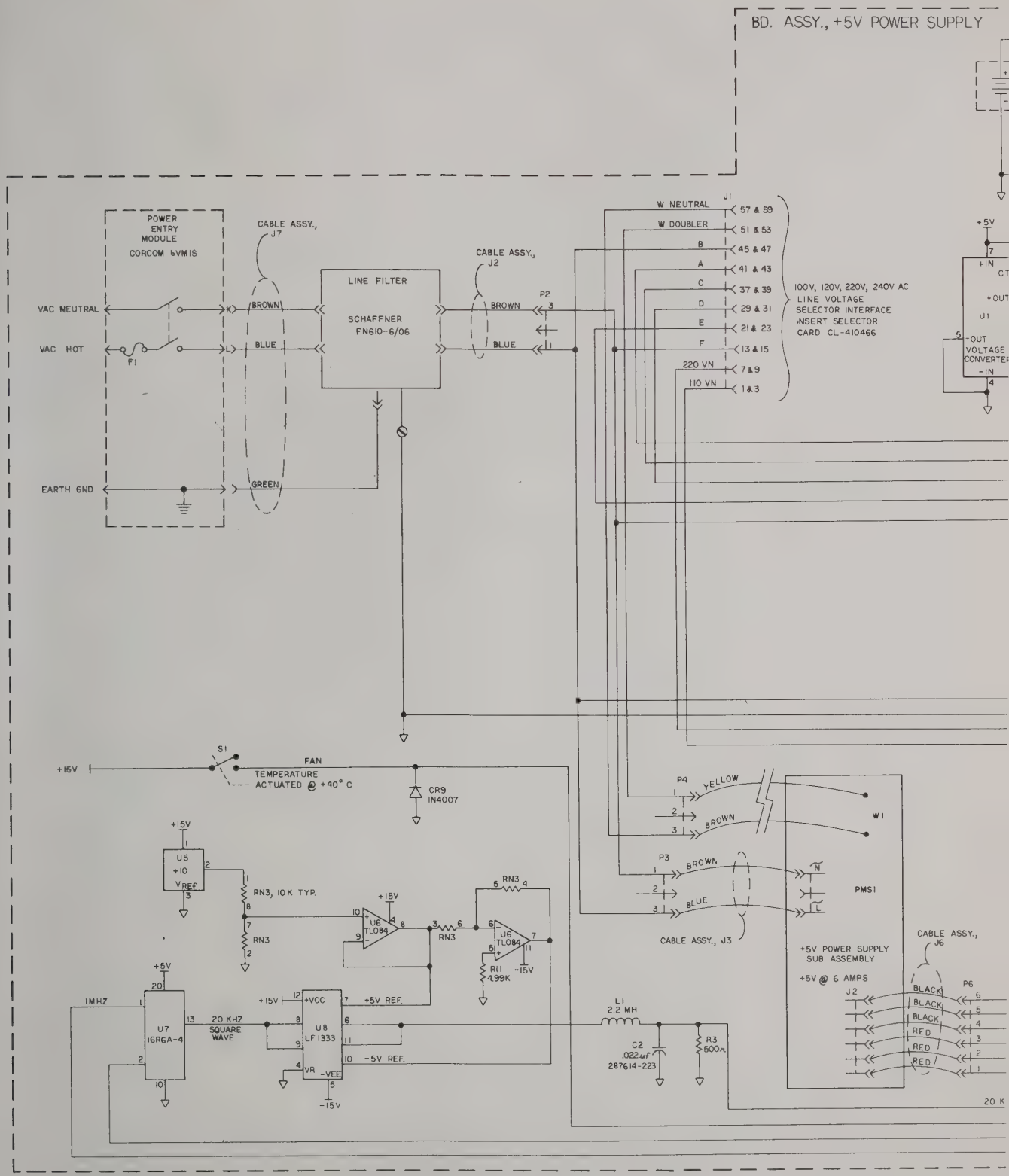
BY	DATE
BD BREMENDOER	10/86
CH Swartz	11/86
PM Zaffarano	11/86

NAME: SCHEMATIC

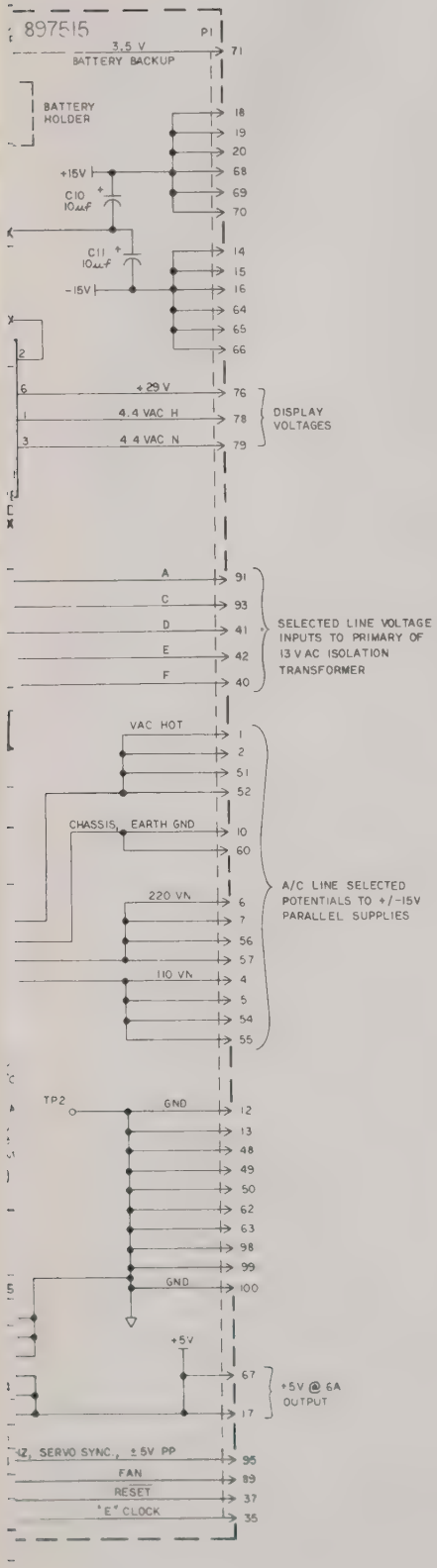
CODE IDENT. 96795 | ISSUE CODE 6

Gould Inc
Instruments Division
Cleveland, Ohio 44114 U.S.A.

DWG NO 297406


BD. ASSY., +5V POWER SUPPLY
POWER ENTRY MODULE
CORCOM 6VM1S
CABLE ASSY., J7
LINE FILTER
SCHAFFNER FN610-6/06
CABLE ASSY., J2
P2
VAC NEUTRAL
VAC HOT
F1
EARTH GND
BROWN
BLUE
GREEN
J1
W NEUTRAL
W DOUBLER
B
A
C
D
E
F
220 VN
110 VN
57 & 59
51 & 53
45 & 47
41 & 43
37 & 39
29 & 31
21 & 23
13 & 15
7 & 9
1 & 3
100V, 120V, 220V, 240V AC LINE VOLTAGE SELECTOR INTERFACE INSERT SELECTOR CARD CL-410466
+5V
+IN
+OUT
U1
-OUT
VOLTAGE CONVERTER
-IN
+15V
S1
FAN
TEMPERATURE ACTUATED @ +40° C
CR9 IN4007
P4
YELLOW
BROWN
W1
P3
BROWN
BLUE
PMS1
CABLE ASSY., J3
+5V POWER SUPPLY SUB ASSEMBLY
+5V @ 6 AMPS
CABLE ASSY., J6
J2
P6
BLACK
BLACK
BLACK
RED
RED
RED
U5 +10 VREF
RN3, 10K TYP.
RN3
U6 TL084
RN3
RN3
U6 TL084
R11 4.99K
-15V
1MHZ
U7 16R6A-4
20 KHZ SQUARE WAVE
U8 LF1333
+VCC
+5V REF.
VR
-VEE
-5V REF.
L1 2.2 MH
C2 .022 uf 287614-223
R3 500Ω
20 K

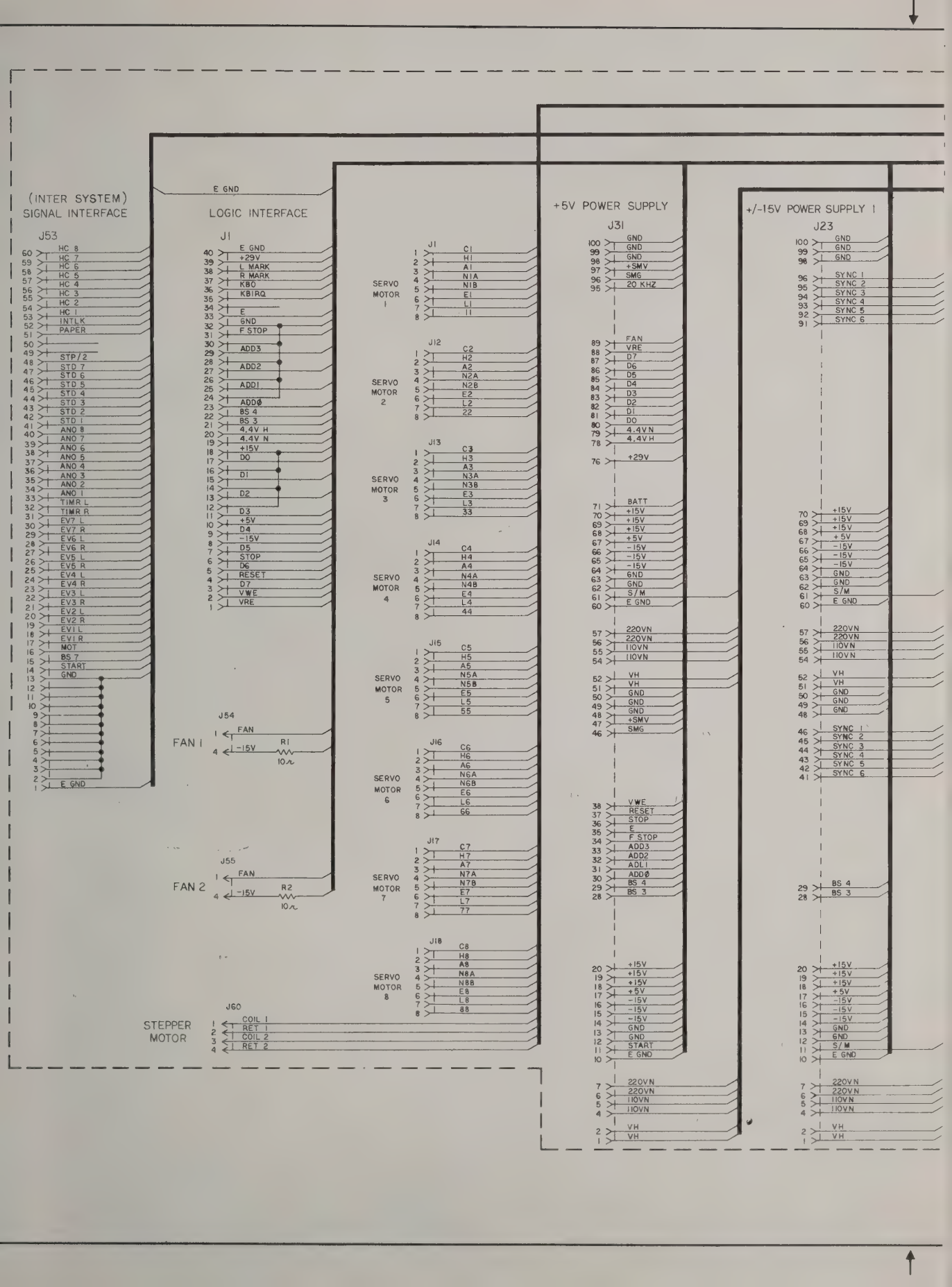
REVISIONS		
SYM	DESCRIPTION	DATE
J-1	NOT AFFECTED PER DCN 34267/A. SOTEROS.	6-9-87



BOARD ASS'Y., 5V POWER SUPPLY 897515

BY	DATE	NAME	Gould Inc Instruments Division Cleveland Ohio 44114 U.S.A.
DR BRUMENOUT	11-6	SCHEMATIC	
CK H. Swartz	11-6		
APP G. Bonnell	11/6	CODE IDENT. 96795	ISSUE CODE G
			DWG NO 297515

297515


(INTER SYSTEM)
SIGNAL INTERFACE
J53
HC 8
HC 7
HC 6
HC 5
HC 4
HC 3
HC 2
HC 1
INTLK
PAPER
STP/2
STD 7
STD 6
STD 5
STD 4
STD 3
STD 2
STD 1
ANO 8
ANO 7
ANO 6
ANO 5
ANO 4
ANO 3
ANO 2
ANO 1
TIMR L
TIMR R
EV7 L
EV7 R
EV6 L
EV6 R
EV5 L
EV5 R
EV4 L
EV4 R
EV3 L
EV3 R
EV2 L
EV2 R
EV1 L
EV1 R
MOT
BS 7
START
GND
E GND
LOGIC INTERFACE
J1
E GND
+29V
L MARK
R MARK
KBO
KBIRQ
E
GND
F STOP
ADD3
ADD2
ADD1
ADDØ
BS 4
BS 3
4.4V H
4.4V N
+15V
DO
D1
D2
D3
+5V
D4
-15V
D5
STOP
D6
RESET
D7
VWE
VRE
E GND
J54
FAN 1
FAN
-15V
R1
10Ω
J55
FAN 2
FAN
-15V
R2
10Ω
J60
STEPPER MOTOR
COIL 1
RET 1
COIL 2
RET 2
SERVO MOTOR 1
J1
C1
H1
A1
N1A
N1B
E1
L1
11
SERVO MOTOR 2
J12
C2
H2
A2
N2A
N2B
E2
L2
22
SERVO MOTOR 3
J13
C3
H3
A3
N3A
N3B
E3
L3
33
SERVO MOTOR 4
J14
C4
H4
A4
N4A
N4B
E4
L4
44
SERVO MOTOR 5
J16
C5
H5
A5
N5A
N5B
E5
L5
55
SERVO MOTOR 6
J16
C6
H6
A6
N6A
N6B
E6
L6
66
SERVO MOTOR 7
J17
C7
H7
A7
N7A
N7B
E7
L7
77
SERVO MOTOR 8
J18
C8
H8
A8
N8A
N8B
E8
L8
88
+5V POWER SUPPLY
J31
GND
GND
GND
+SMV
SMG
20 KHZ
FAN
VRE
D7
D6
D5
D4
D3
D2
D1
DO
4.4VN
4.4VH
+29V
BATT
+15V
+15V
+15V
+5V
-15V
-15V
-15V
GND
GND
S/M
E GND
220VN
220VN
110VN
110VN
VH
VH
GND
GND
GND
+SMV
SMG
VWE
RESET
STOP
E
F STOP
ADD3
ADD2
ADD1
ADDØ
BS 4
BS 3
+15V
+15V
+15V
+5V
-15V
-15V
-15V
GND
GND
START
E GND
220VN
220VN
110VN
110VN
VH
VH
+/-15V POWER SUPPLY 1
J23
GND
GND
GND
SYNC 1
SYNC 2
SYNC 3
SYNC 4
SYNC 5
SYNC 6
+15V
+15V
+15V
+5V
-15V
-15V
-15V
GND
GND
S/M
E GND
220VN
220VN
110VN
110VN
VH
VH
GND
GND
GND
SYNC 1
SYNC 2
SYNC 3
SYNC 4
SYNC 5
SYNC 6
BS 4
BS 3
+15V
+15V
+15V
+5V
-15V
-15V
-15V
GND
GND
S/M
E GND
220VN
220VN
110VN
110VN
VH
VH

REVISIONS		
SYM	DESCRIPTION	DATE
G	ORIGINAL RELEASE DCN 33730 SWARTZ	12-15-86

MOTHER BD. ASSY., 897517

MOTOR/ PREAMP BUS
SIGNAL BUS
LOGIC BUS

TO SHEET 2

+/-15V POWER SUPPLY 2

J22

100	GND
99	GND
98	GND
96	SYNC 1
95	SYNC 2
94	SYNC 3
93	SYNC 4
92	SYNC 5
91	SYNC 6
70	+15V
69	+15V
68	+15V
67	+5V
66	-15V
65	-15V
64	-15V
63	GND
62	GND
61	
60	E GND
57	220VN
56	220VN
55	110VN
54	110VN
52	VH
51	VH
50	GND
49	GND
48	GND
46	SYNC 1
45	SYNC 2
44	SYNC 3
43	SYNC 4
42	SYNC 5
41	SYNC 6
29	BS 4
28	BS 3
20	+15V
19	+15V
18	+15V
17	+5V
16	-15V
15	-15V
14	-15V
13	GND
12	GND
11	S/M
10	E GND
7	220VN
6	220VN
5	110VN
4	110VN
2	VH
1	VH

+/-15V POWER SUPPLY 3

J21

100	GND
99	GND
98	GND
96	SYNC 1
95	SYNC 2
94	SYNC 3
93	SYNC 4
92	SYNC 5
91	SYNC 6
70	+15V
69	+15V
68	+15V
67	+5V
66	-15V
65	-15V
64	-15V
63	GND
62	GND
61	
60	E GND
57	220VN
56	220VN
55	110VN
54	110VN
52	VH
51	VH
50	GND
49	GND
48	GND
46	SYNC 1
45	SYNC 2
44	SYNC 3
43	SYNC 4
42	SYNC 5
41	SYNC 6
29	BS 4
28	BS 3
20	+15V
19	+15V
18	+15V
17	+5V
16	-15V
15	-15V
14	-15V
13	GND
12	GND
11	S/M
10	E GND
7	220VN
6	220VN
5	110VN
4	110VN
2	VH
1	VH

297517

BOARD ASS'Y, MOTHER - 8 CH, 897517

BY	DATE
DR BREMENOUR	11-86
H. Swartz	12-15-86
Gal Cornell	12-16-86

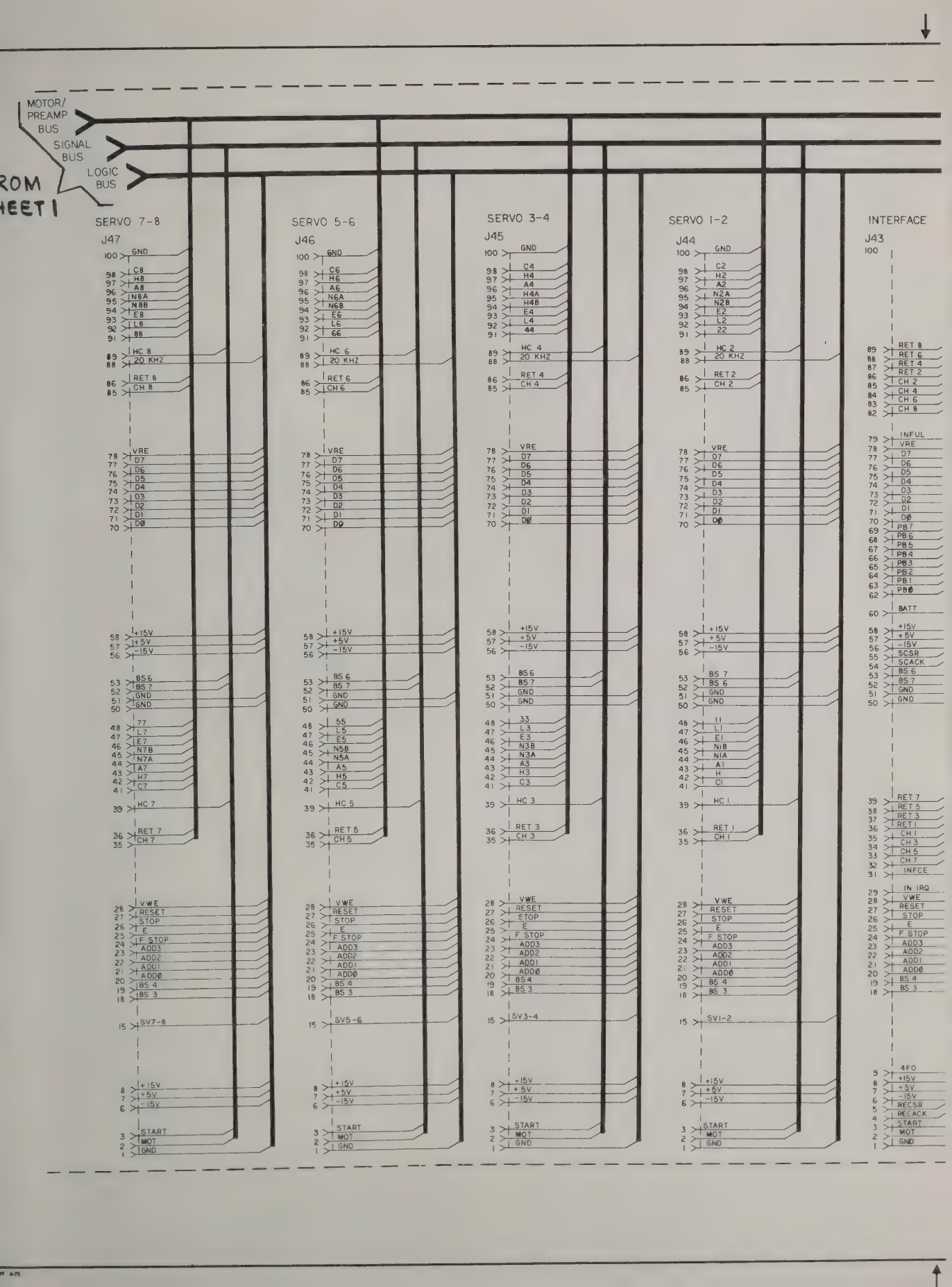
SCHEMATIC

Gould Inc. Instruments Division

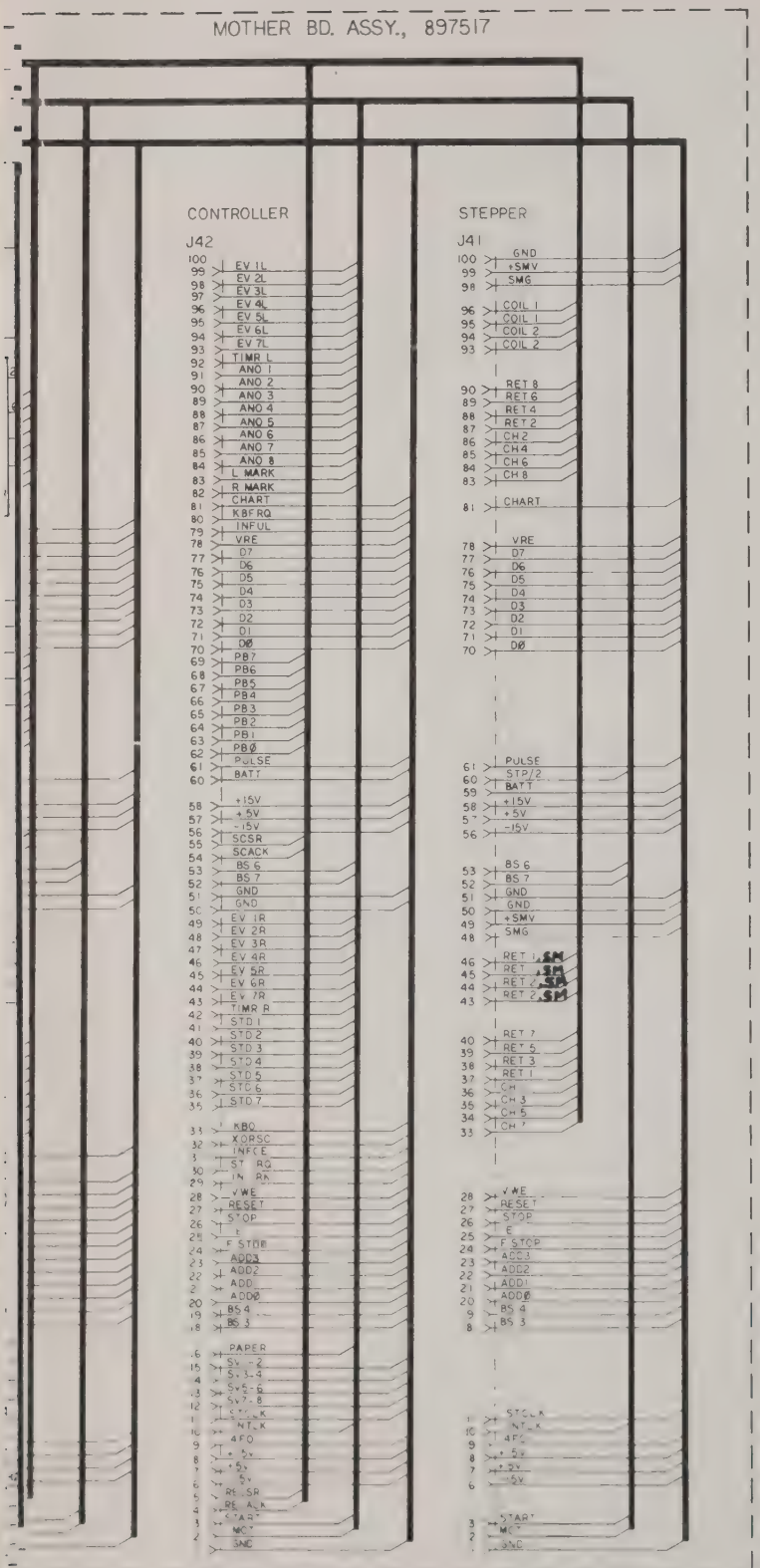
CODE IDENT 96795 SIZE A

DWG NO 297517

SHEET 1 OF 2


MOTOR/ PREAMP BUS
SIGNAL BUS
LOGIC BUS
ROM HEET 1
SERVO 7-8
J47
SERVO 5-6
J46
SERVO 3-4
J45
SERVO 1-2
J44
INTERFACE
J43

REVISIONS		
SYM	DESCRIPTION	DATE

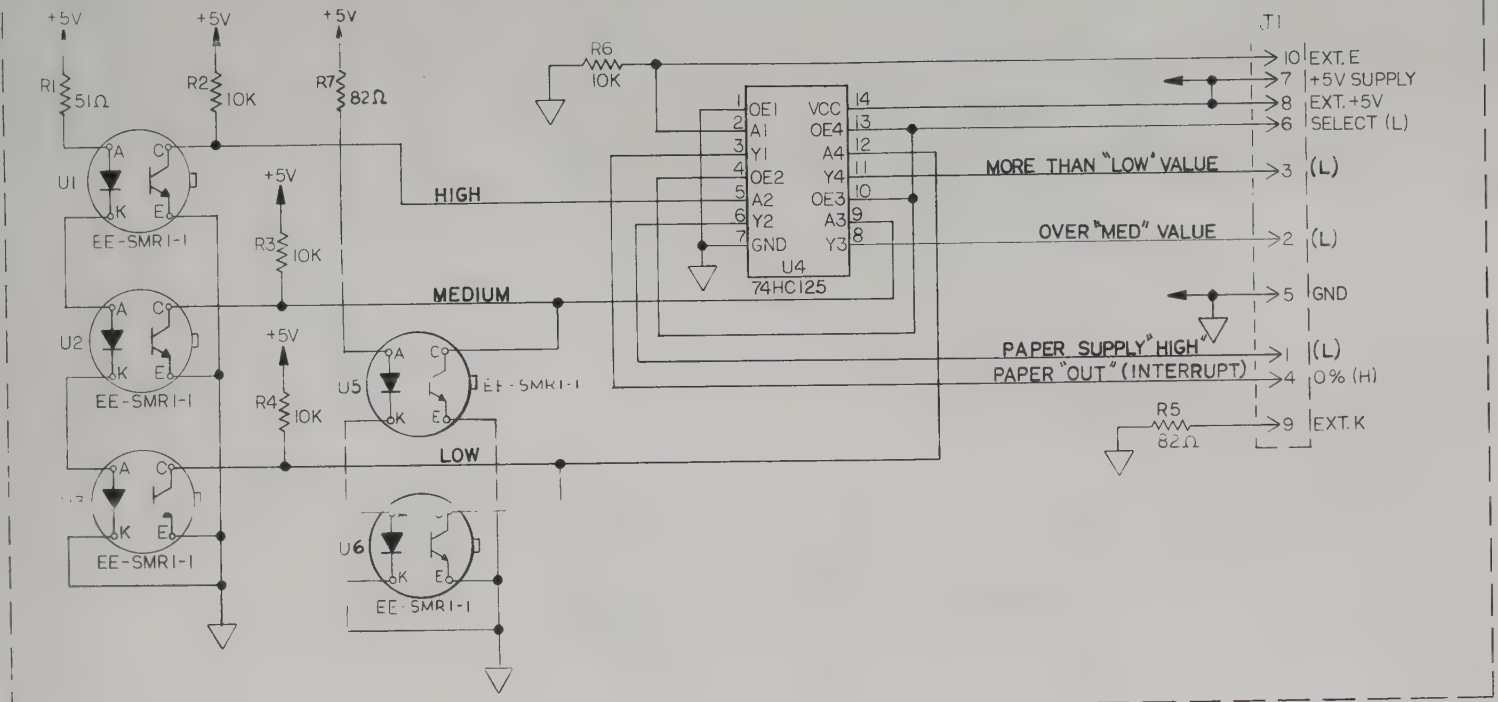


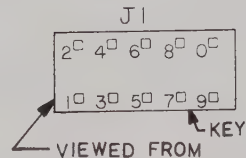
BOARD ASS'Y., MOTHER - 8 CH. 897517

BY	DATE	NAME	Gould Inc. Instruments Division Cleveland, Ohio 44114 U.S.A.
DR BREMENOUR	12-15-86	SCHEMATIC	
H. Swartz	12-15-86	CODE IDENT 96795	SIZE CODE G
J. Conrad	12-16-86		DWG NO. 297517
			SHEET 2 OF 2

REVISIONS			
SYM	DESCRIPTION	DATE	
	ORIGINAL RELEASE DCN 33612		
E	REVISED PER DCN 33961 CLARK	3-12-87	

CHART SUPPLY SENSOR BOARD 897635





2.) SENSOR SYMBOLS ARE LEAD END VIEWS

1.) (L) OR (H) = CONDITION "TRUE" FOR LOW (L) OR HIGH (H) TTL LEVEL AT INDICATED TERMINAL.

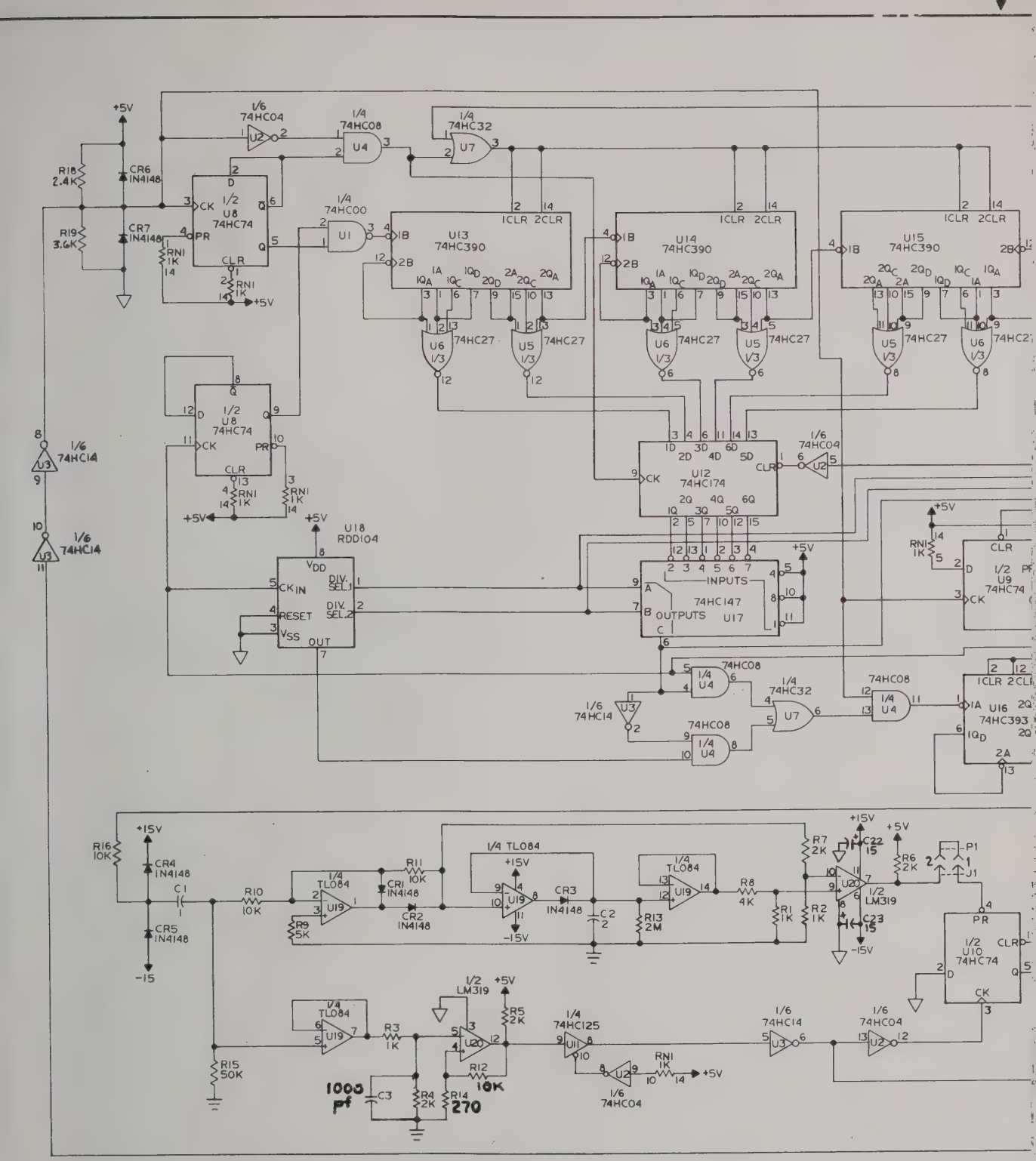
NOTES:

BOARD ASS'Y, CHART SUPPLY SENSOR 897635

	BY	DATE	NAME
DR	J. KOCHIS	9-86	SCHEMATIC
CH		11-86	
APP		11/86	

CODE IDENT: 96795 ISSUE CODE: G

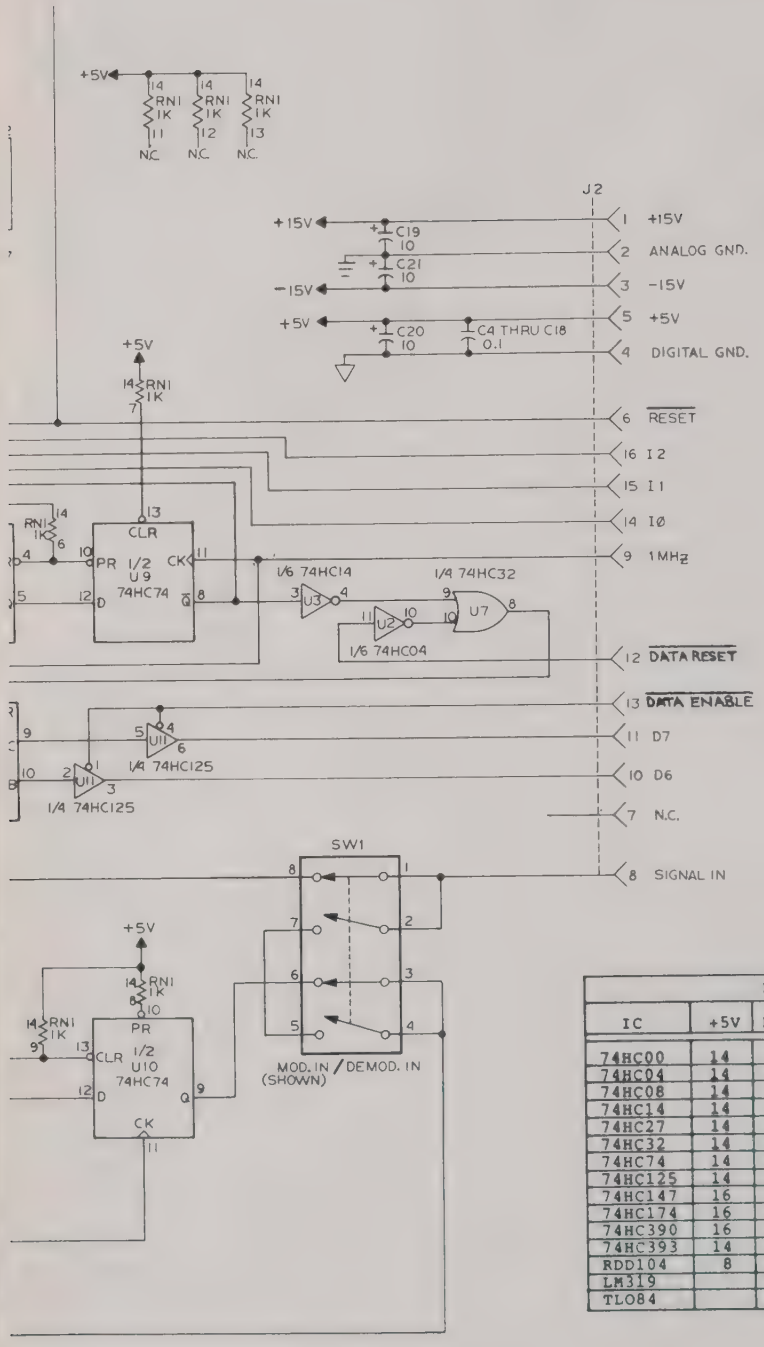
Gould Inc
Instruments Division
Cleveland, Ohio 44114 U.S.A.
DWG. NO. 297635



- ⏚ - ANALOG GROUND
- ▽ - DIGITAL GROUND
- UNLESS OTHERWISE INDICATED:
  ALL CAPACITANCE IN MICROFARADS
  ALL RESISTANCE IN OHMS
  ALL RESISTORS 1/4W, 1%

ES:

REVISIONS		
SYM	DESCRIPTION	DATE
E	NOT AFFECTED PER DCN 33201 SWARTZ	8-6-86

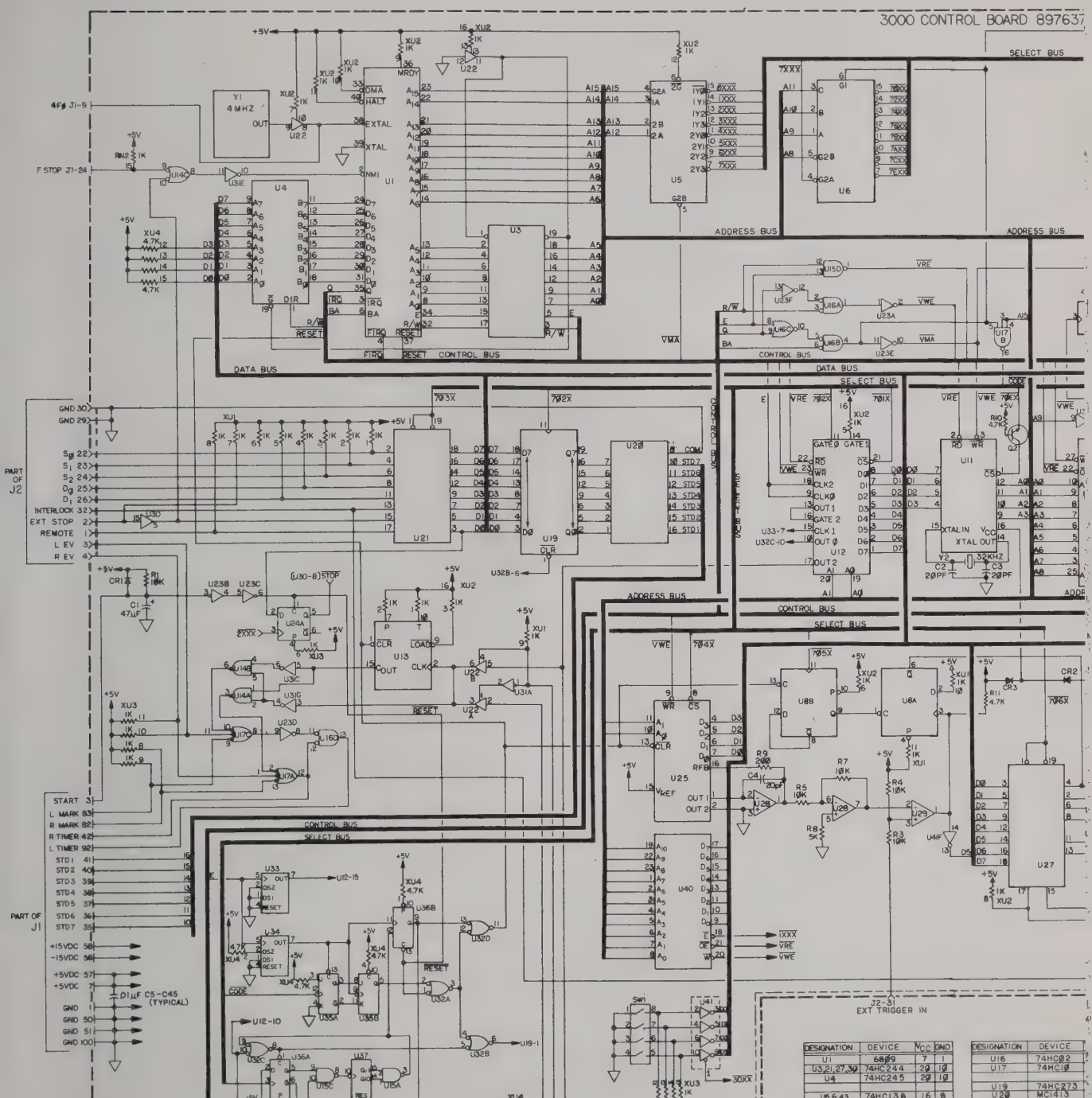


POWER/GROUND PIN CHART					
IC	+5V	DIGITAL GND	+15V	-15V	SYMBOL
74HC00	14	7			U1
74HC04	14	7			U2
74HC08	14	7			U4
74HC14	14	7			U3
74HC27	14	7			U5,6
74HC32	14	7			U7
74HC74	14	7			U8,9,10
74HC125	14	7			U11
74HC147	16	8			U17
74HC174	16	8			U12
74HC390	16	8			U13,14,15
74HC393	14	7			U16
RDD104	8	3			U18
LM319			11	6	U20
TL084			4	11	U19

BOARD ASSY., IRIG 897636

BY	DATE	NAME	Gould Inc Instruments Division Cleveland, Ohio 44114 U.S.A.
DR P. MILLER	1/1/86	SCHEMATIC	
CH CZECH	1/9/86	CODE IDENT 96795	ISSUE CODE G
APP J. SWARTZ	1/10/86		DWG NO 297636

297636

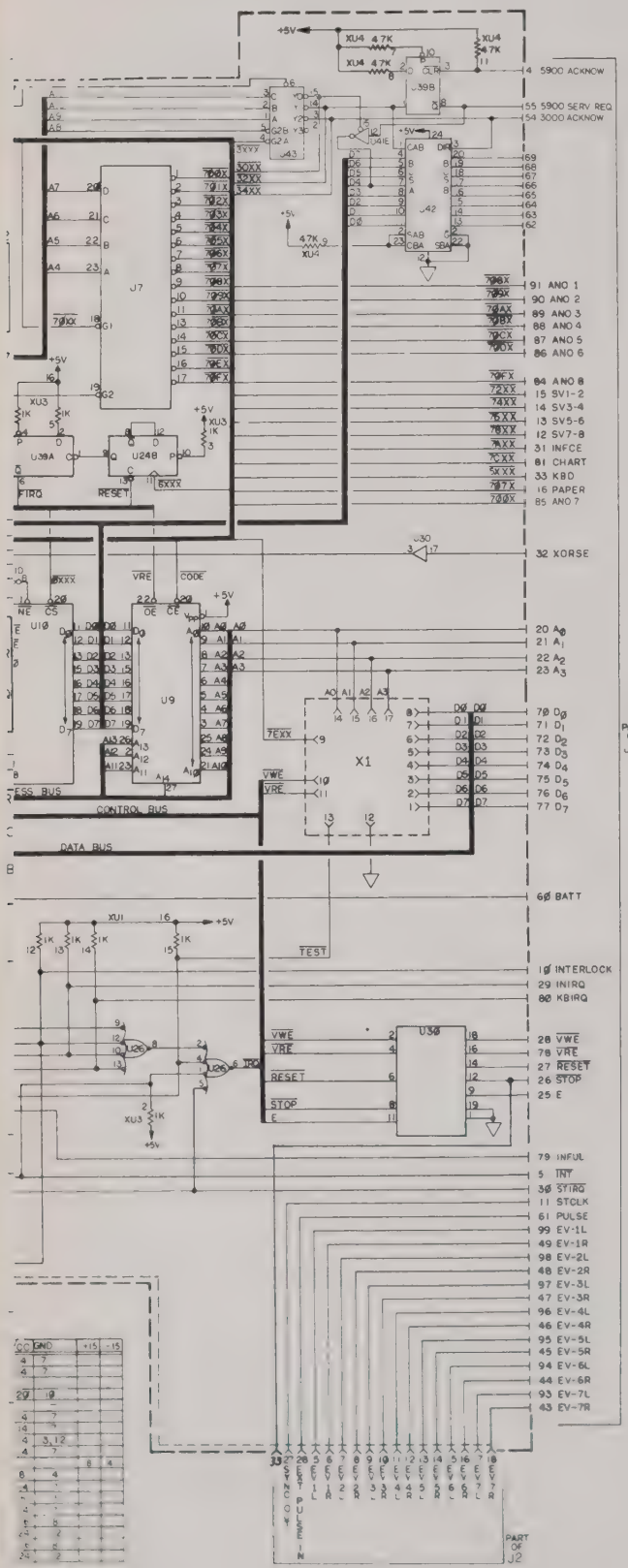


DESIGNATION	DEVICE	V_{CC}	GND
U1	6809	7	1
U3,21,27,30	74HC244	20	10
U4	74HC245	20	10
U5,6,43	74HC138	16	8
U7	74HC154	24	12
U8,24,36,39	74HC74	14	7
U9	27256	28	14
U10	2004	28	14
U11	58274	—	8
U12	8254	24	12
U13	74HC160	16	8
U14,15	74HC00	14	7

DESIGNATION	DEVICE
U16	74HC02
U17	74HC10
U19	74HC273
U20	MC1413
U22	74HC126
U23,31	74HC14
U25	AD7542
U26	74HC21
U28	LF412
U29	LM393
U32	74HC08
U33,34	RDD104
U35	74HC107
U37	74HC4020
U40	2K X 8 RAM
U41	74HC368
U42	74HC646

NOTE: UNLESS OTHERWISE INDICATED.
ALL CAPACITANCE IN MICROFARADS.
ALL RESISTANCE IN OHMS.
ALL RESISTORS .25 WATT, 10%.

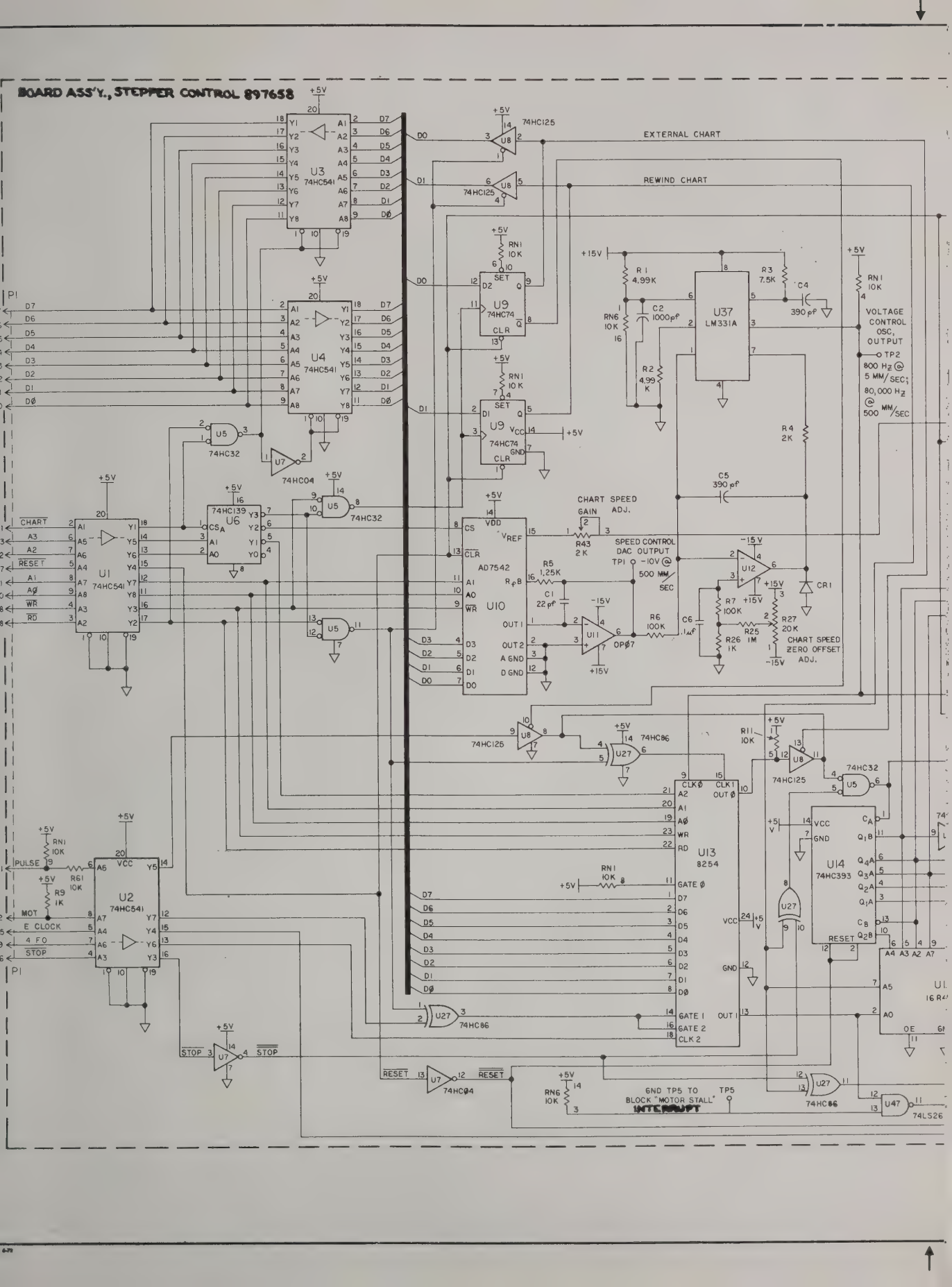
REVISIONS		
SYM	DESCRIPTION	DATE
S	NOT AFFECTED PER DCN 34378 RIVERA	7-29-87



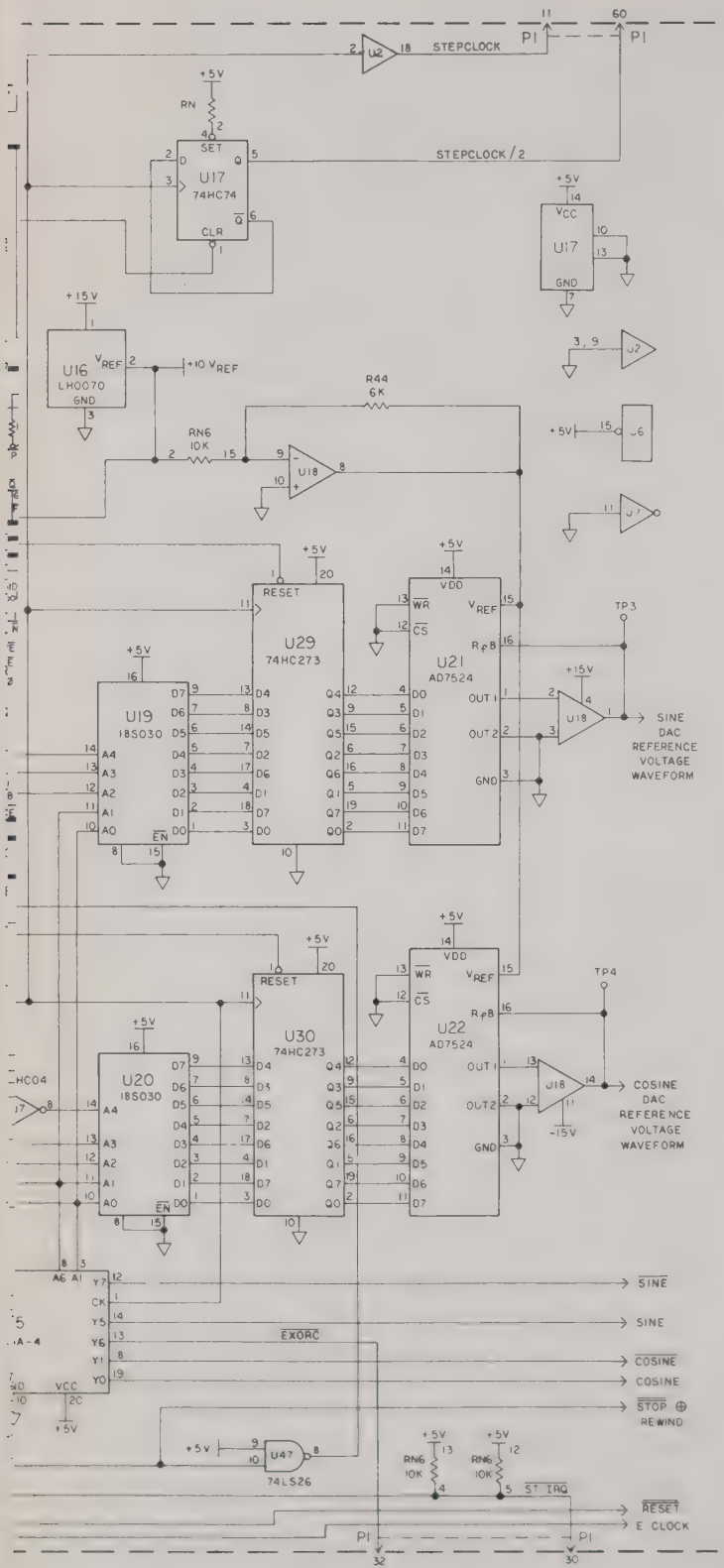
897637-1

BOARD ASSY, CONTROL 897637

BY	DATE	NAME	
DR J. KOCHIS	6-20-86	SCHEMATIC	Gould Inc Instruments Division Cleveland Ohio 44114 U.S.A.
CH SWARTZ	11/86	CODE IDENT 96795	ISSUE CODE G
APP KRAIZEL	12/86		DWG NO 297637


BOARD ASS'Y., STEPPER CONTROL 897658
EXTERNAL CHART
REWIND CHART
VOLTAGE CONTROL OSC. OUTPUT
TP2
800 Hz @ 5 MM/SEC; 80,000 Hz @ 500 MM/SEC
CHART SPEED GAIN ADJ.
SPEED CONTROL DAC OUTPUT
TP1
-10V @ 500 MM/SEC
CHART SPEED ZERO OFFSET ADJ.
GND TP5 TO BLOCK "MOTOR STALL" INTERRUPT
TP5
74HC541
74HC125
74HC74
74HC32
74HC04
74HC139
74HC86
AD7542
OP07
LM331A
74HC393
8254
74LS26
U1
U2
U3
U4
U5
U6
U7
U8
U9
U10
U11
U12
U13
U14
U27
U37
U47

REVISIONS		
SYM.	DESCRIPTION	DATE
E-1	ORIGINAL REL. ISSUE LEVEL DCN 33660/A. SOTEROS	1-30-87
F-1	REVISED PER DCN 34313/A. SOTEROS	7-6-87



S. THIS BOARD CONTAINS STATIC SENSITIVE COMPONENTS AND MUST BE HANDLED PER MEI-0011.

1. UNLESS OTHERWISE INDICATED, ALL CAPACITANCE IN MICROFARADS.
   ALL RESISTANCE IN OHMS.
   ALL RESISTORS ±1%, 1/4 WATT.

NOTES:

BOARD ASS'Y., STEPPER CONTROL 897658

BY	DATE
OR	
C. BRENEMAN	1-30-87
W. Swartz	1-30-87
[illegible]	1/30/87

NAME: SCHEMATIC

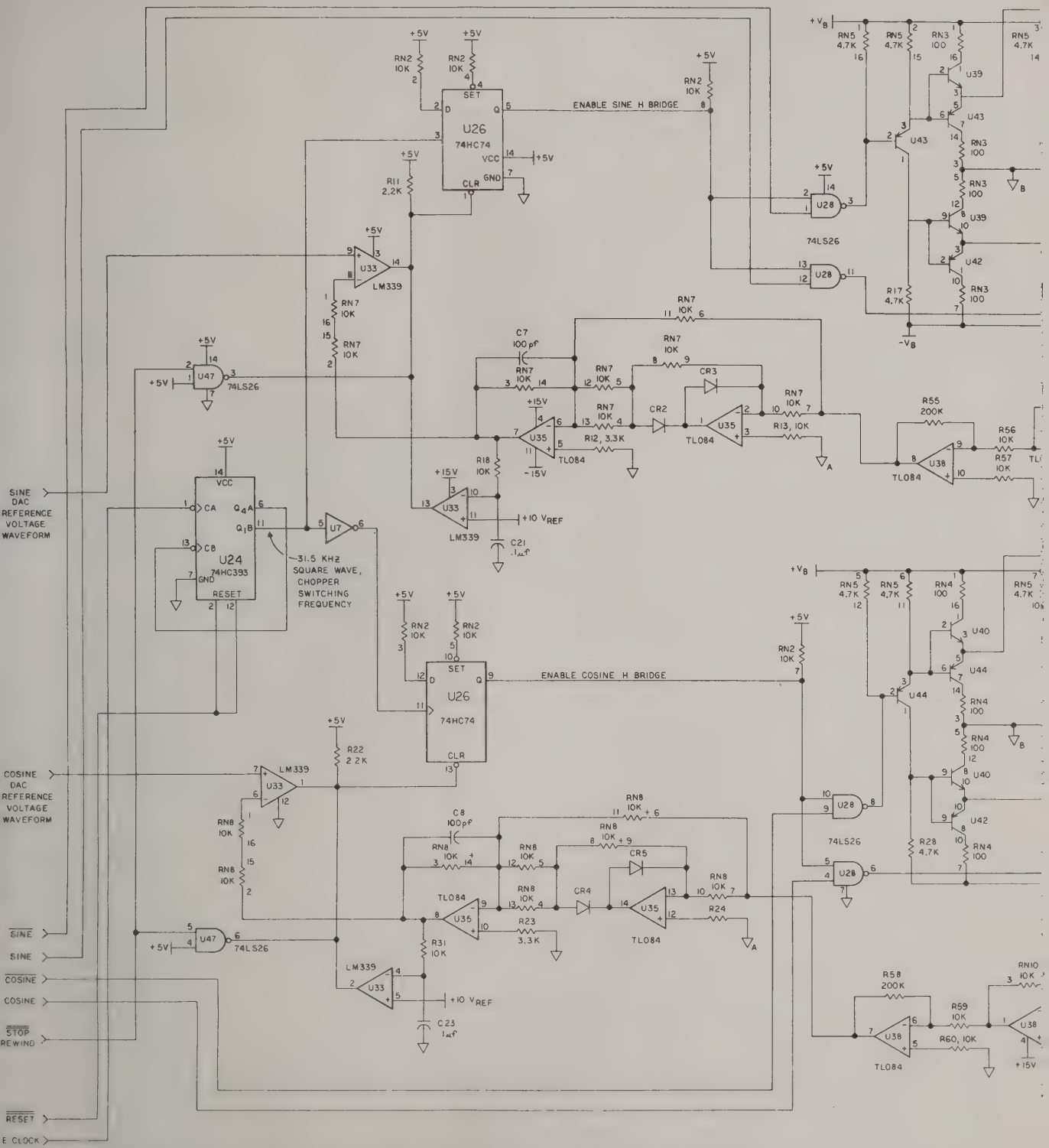
Gould Inc.
Instruments Division
Cleveland, Ohio 44114 U.S.A.

CODE IDENT: 96795 | ISSUE CODE: G

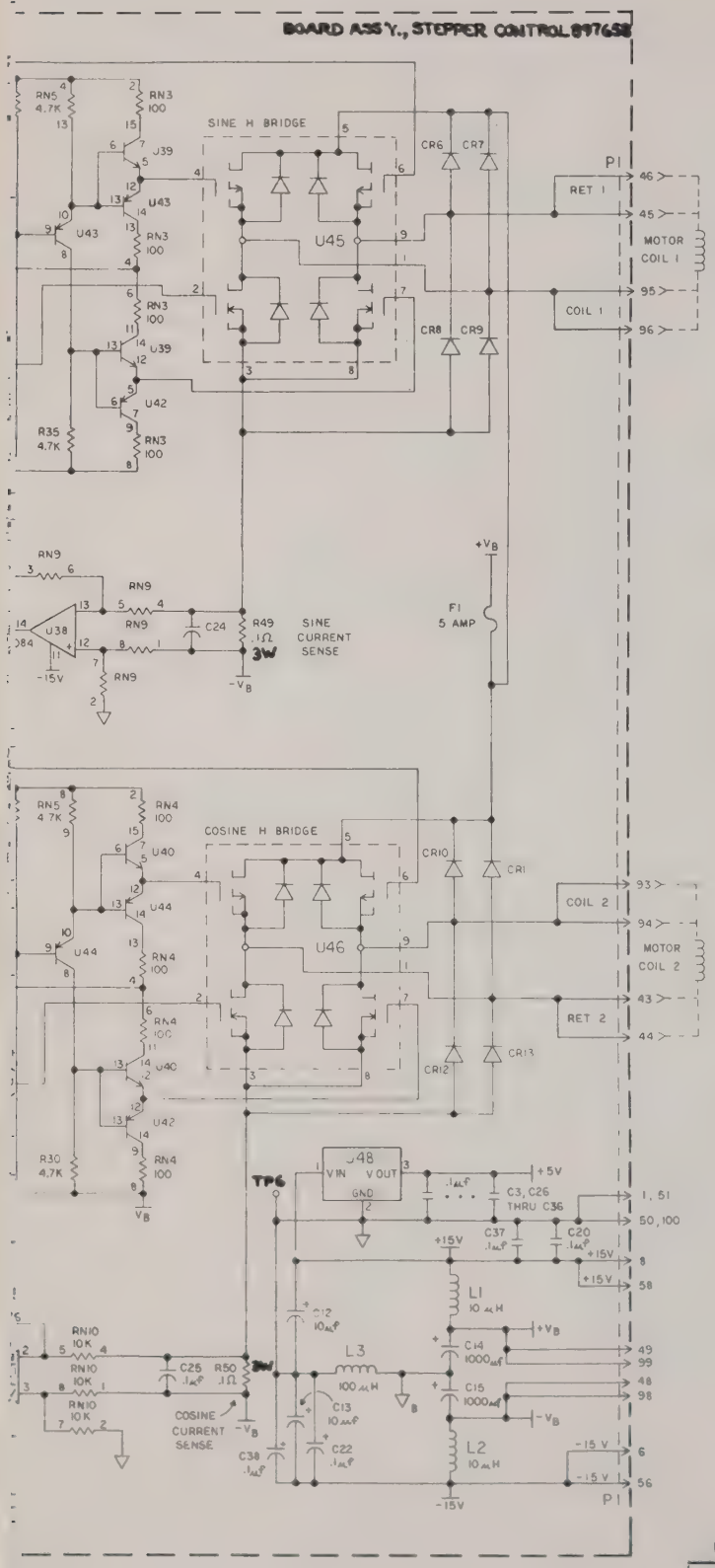
DWG. NO. 297658

SHEET 1 OF 2

297658


SINE DAC REFERENCE VOLTAGE WAVEFORM
COSINE DAC REFERENCE VOLTAGE WAVEFORM
SINE
SINE
COSINE
COSINE
STOP REWIND
RESET
E CLOCK
U26 74HC74
ENABLE SINE H BRIDGE
ENABLE COSINE H BRIDGE
U24 74HC393
~31.5 KHz SQUARE WAVE, CHOPPER SWITCHING FREQUENCY
LM339
TL084
74LS26
+10 VREF
+5V
+15V
-15V
+VB
-VB

REVISIONS		F-1
SYM	DESCRIPTION	DATE

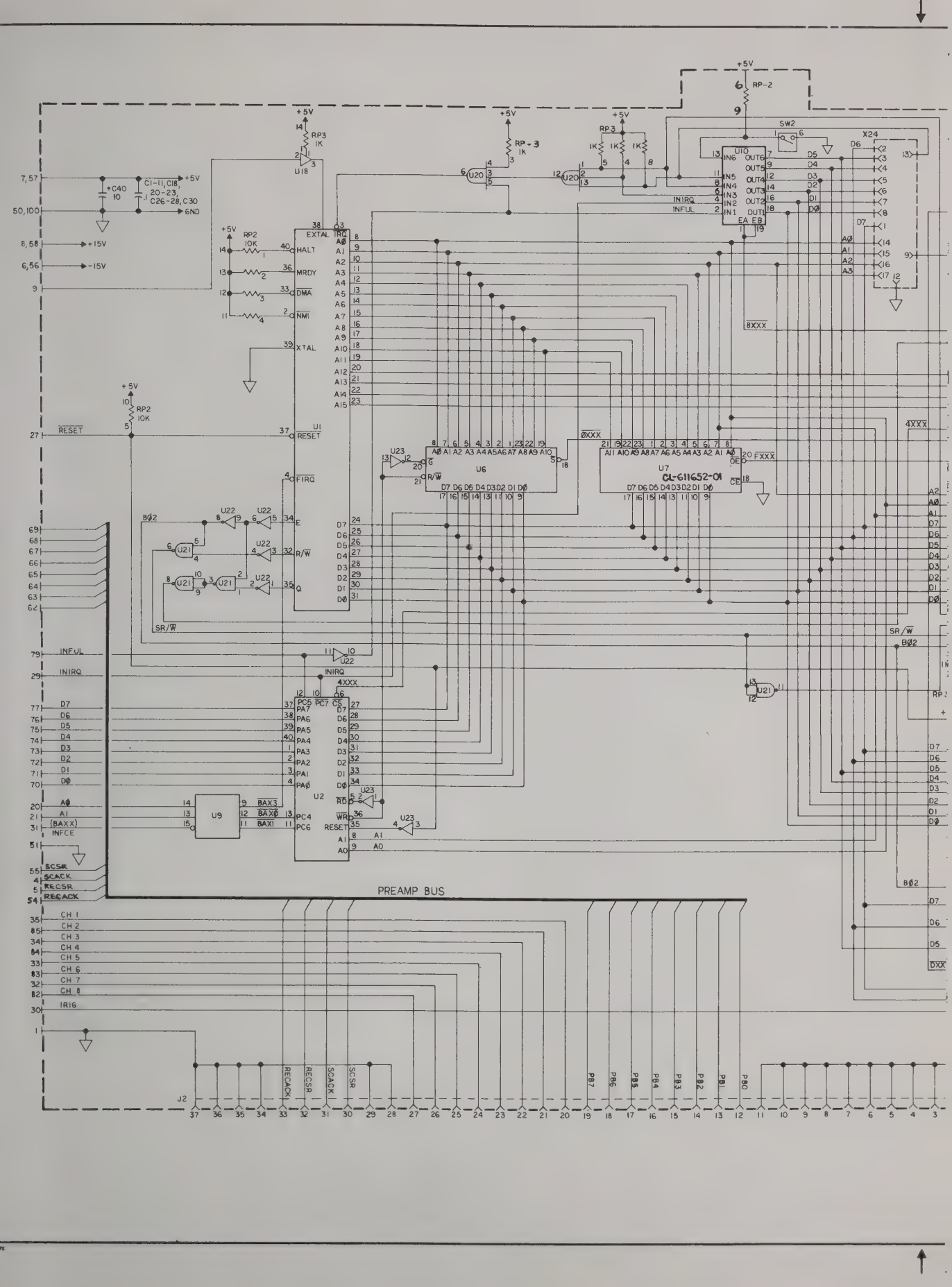


BOARD ASS'Y., STEPPER CONTROL 897658

BY	DATE
DR C. DEMENOLA	1-26-89
	1-30-89

NAME	SCHEMATIC	Gould Inc. Instruments Division Cleveland, Ohio 44114 U.S.A.
CODE IDENT 96795	ISSUE CODE G	DWG. NO 297658
		SHEET 2 OF 2

297658


+5V
RP-2
SW2
X24
U10
U6
U7
CL-611652-01
U2
U9
RP2 10K
RP3 1K
RP-3 1K
C1-11, C18, 20-23, C26-28, C30
+C40 10
RESET
INFUL
INIRQ
SR/W
BØ2
8XXX
ØXXX
4XXX
FXXX
DXX
PREAMP BUS
CH 1
CH 2
CH 3
CH 4
CH 5
CH 6
CH 7
CH 8
IR16
SCSR
SCACK
RECSR
RECACK
P87
P86
P85
P84
P83
P82
P81
P80
J2

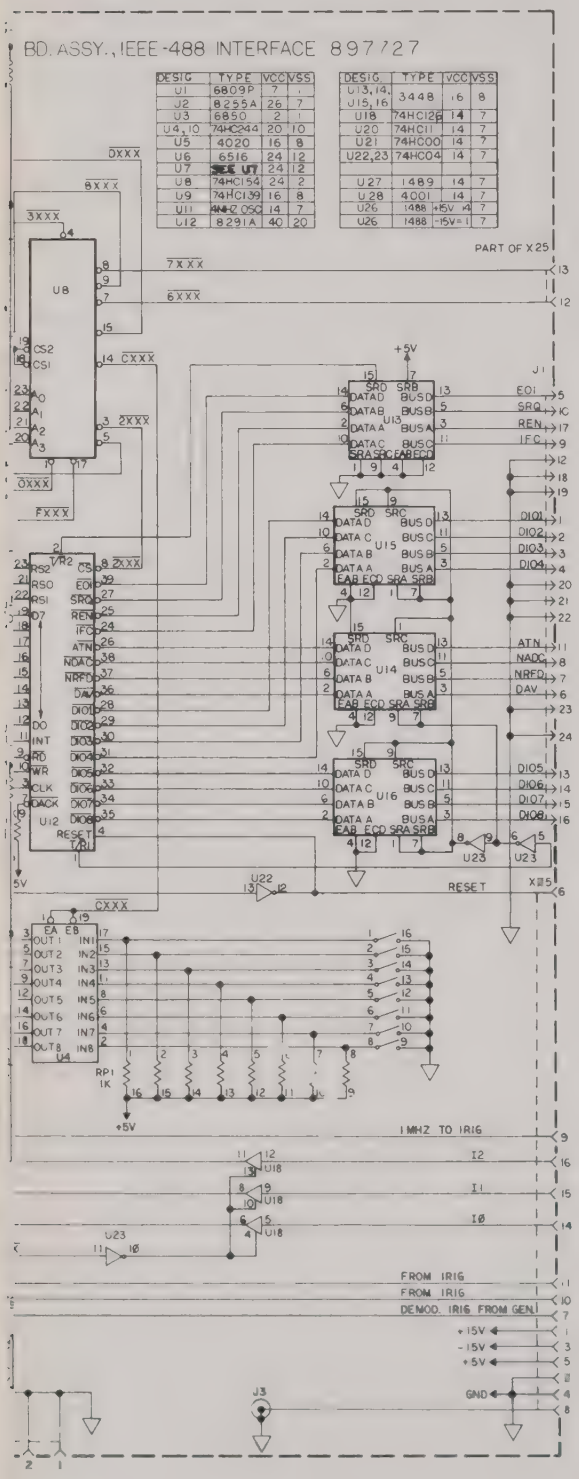
REVISIONS		
SYM	DESCRIPTION	DATE
H	NOT AFFECTED P&L DCN KILGORE 34386	8-4-87

BD. ASSY., IEEE-488 INTERFACE 897727

DESIG	TYPE	VCC	VSS
U1	6809P	7	1
U2	8255A	26	7
U3	6850	2	1
U4,10	74HC244	20	10
U5	4020	16	8
U6	6516	24	12
U7	SEE U7	24	12
U8	74HC154	24	2
U9	74HC139	16	8
U11	AM2 OSC	14	7
U12	8291A	40	20

DESIG	TYPE	VCC	VSS
U13,14, U15,16	3448	16	8
U18	74HC12B	14	7
U20	74HC11	14	7
U21	74HC00	14	7
U22,23	74HC04	14	7
U27	1489	14	7
U28	4001	14	7
U26	1488 +15V	14	7
U26	1488 -15V	11	7

PART OF X25



BOARD ASS'Y., IEEE-488 INTERFACE 897727

BY	DATE
BRENNOOR	11-86
	12-86

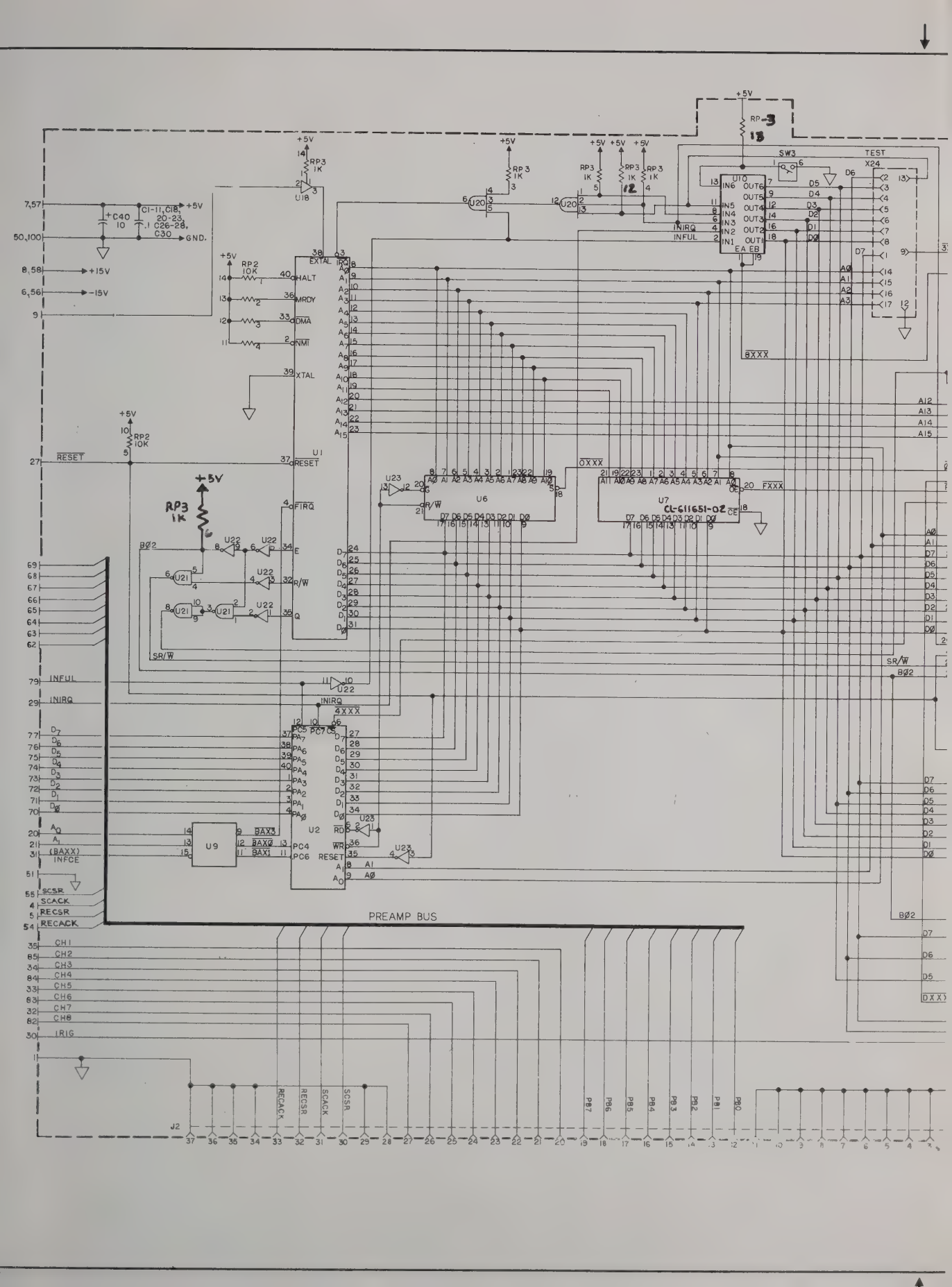
NAME: SCHEMATIC

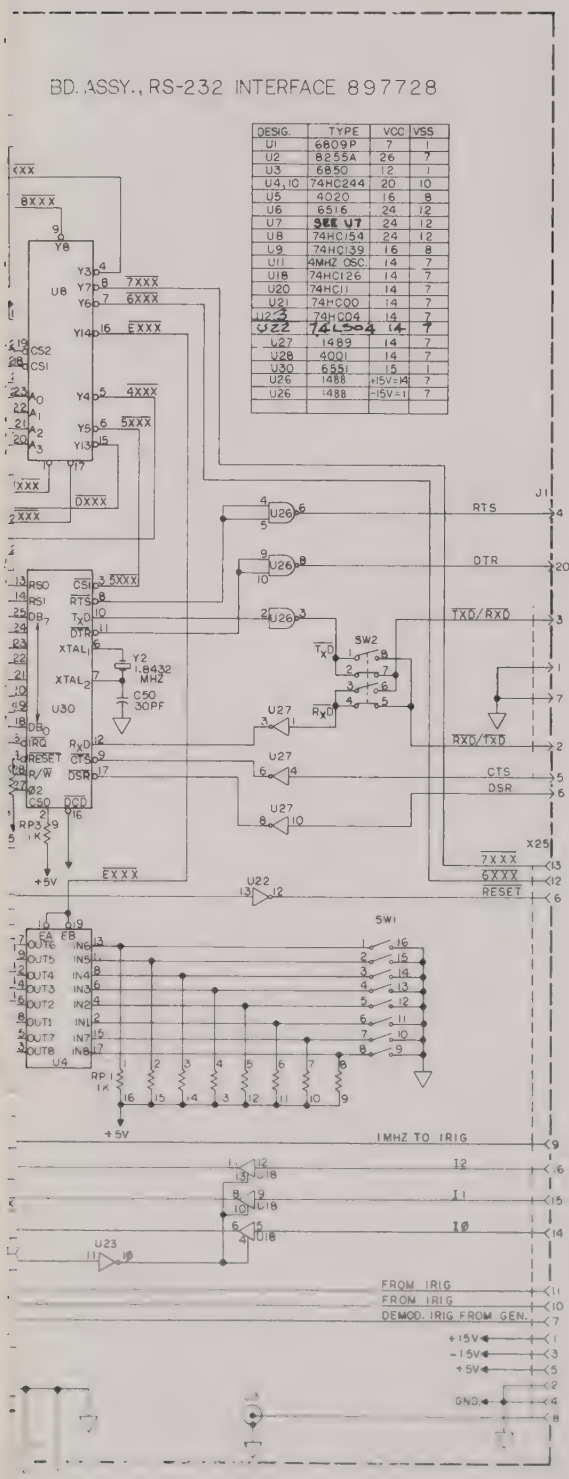
Gould Inc. Instruments Division Cleveland Ohio 44114 U.S.A.

CODE IDENT 96795 | ISSUE CODE G

DWG NO 297727

297727


+5V
RP3 1K
U18
C1-11, C18, 20-23, C26-28, C30
+C40 10
GND
+15V
-15V
RP2 10K
EXTAL
XTAL
HALT
MRDY
DMA
NMI
RESET
FIRQ
E
R/W
Q
SR/W
INFUL
INIRQ
4XXX
U2
U9
(BAXX)
INFCE
SCSR
SCACK
RECSR
RECACK
IRIG
CH1
CH2
CH3
CH4
CH5
CH6
CH7
CH8
PREAMP BUS
U6
U7
CL-611651-02
SW3
TEST
X24
U10
8XXX
0XXX
FXXX
DXXX
J2

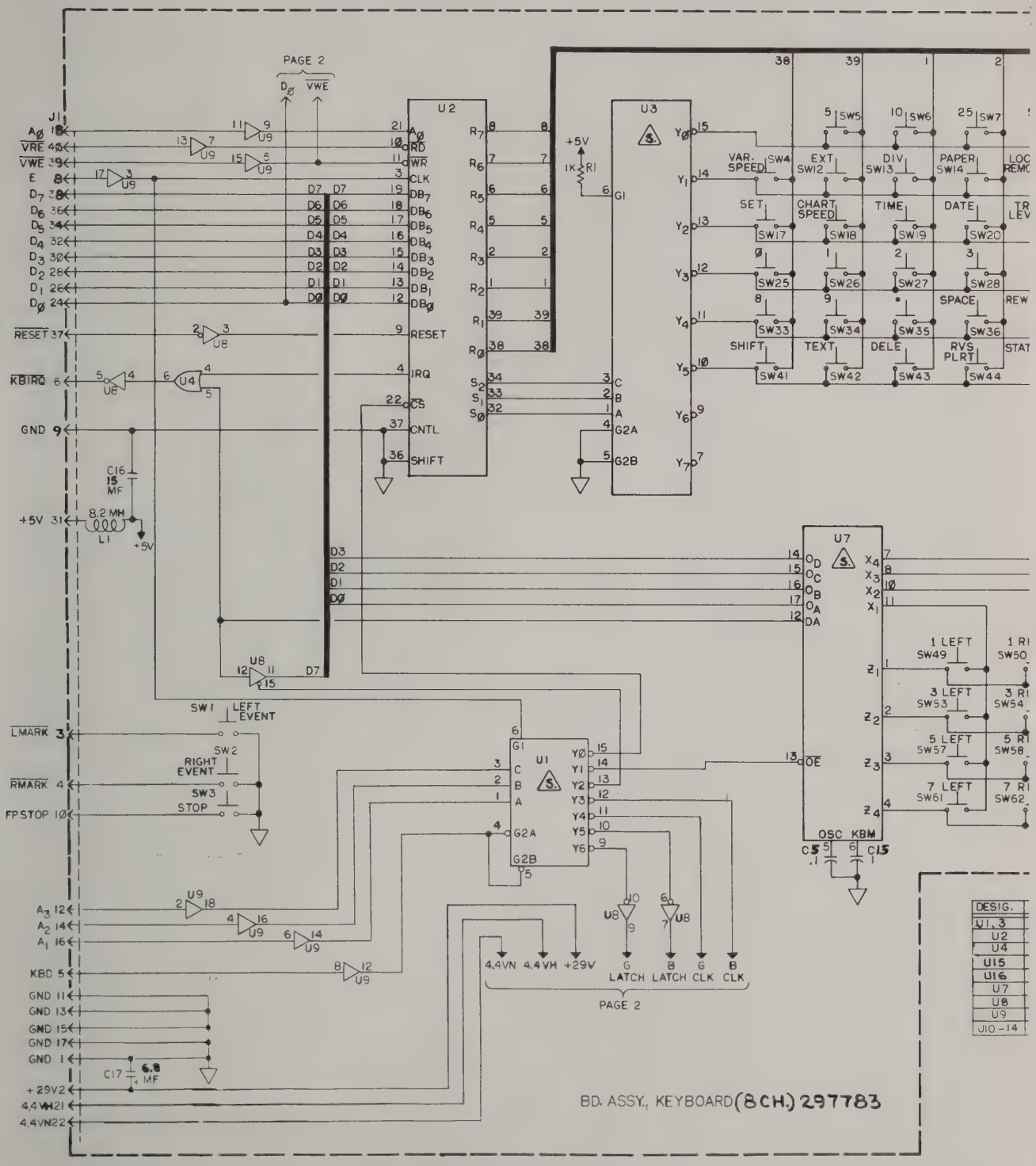


H1 H2	U7 WAS: -01 U22 WAS: 74HC04 PER DCN 34641. KISNER	11/16/87

297728

BOARD ASS'Y, RS-232 INTERFACE 897728

BY	DATE	NAME		
DR BREMENOUR	11-86	SCHEMATIC	Gould Inc Instruments Division	
CHK K. Swartz	12-86			
APP J. Moore	12/86	CODE IDENT 96795	ISSUE CODE G	DWG NO. 297728



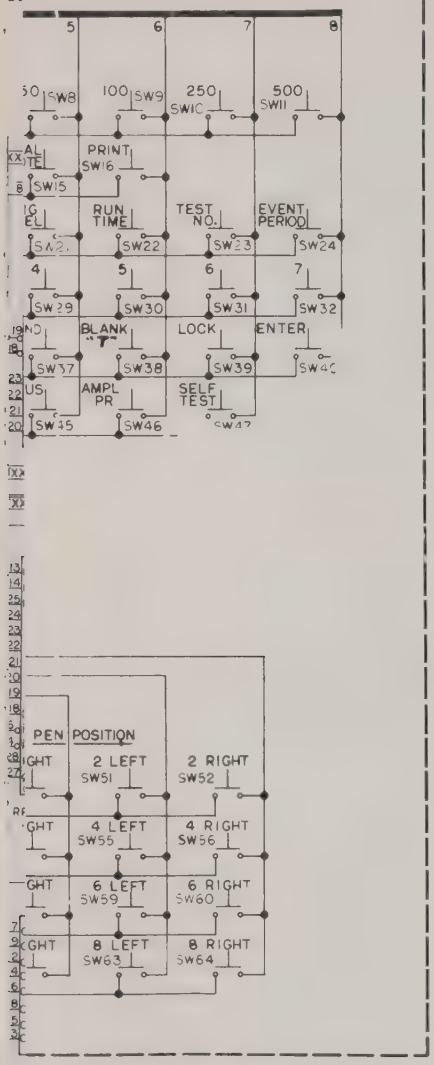
DESIG.
U1, 3
U2
U4
U15
U16
U7
U8
U9
U10-14

NOTE: UNLESS OTHERWISE INDICATED:
1. ALL CAPACITANCE IN MICROFARADS.
ALL RESISTANCE IN OHMS.
ALL RESISTORS .15 WATT, 2%.

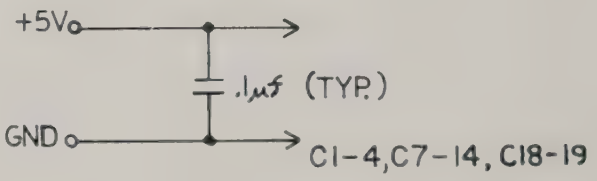
2. CIRCUITRY ON SHEET 3 USED ON MARK 200A ONLY. (897783-1)

S. THIS BOARD CONTAINS STATIC SENSITIVE COMPONENTS AND MUST BE HANDLED PER MEI-0011 TITLED: "STATIC SENSITIVE COMPONENTS."

REVISIONS		
SYM.	DESCRIPTION	DATE
G-1	REVISED PER DCN 34331/A SOTEROS	7-10-87



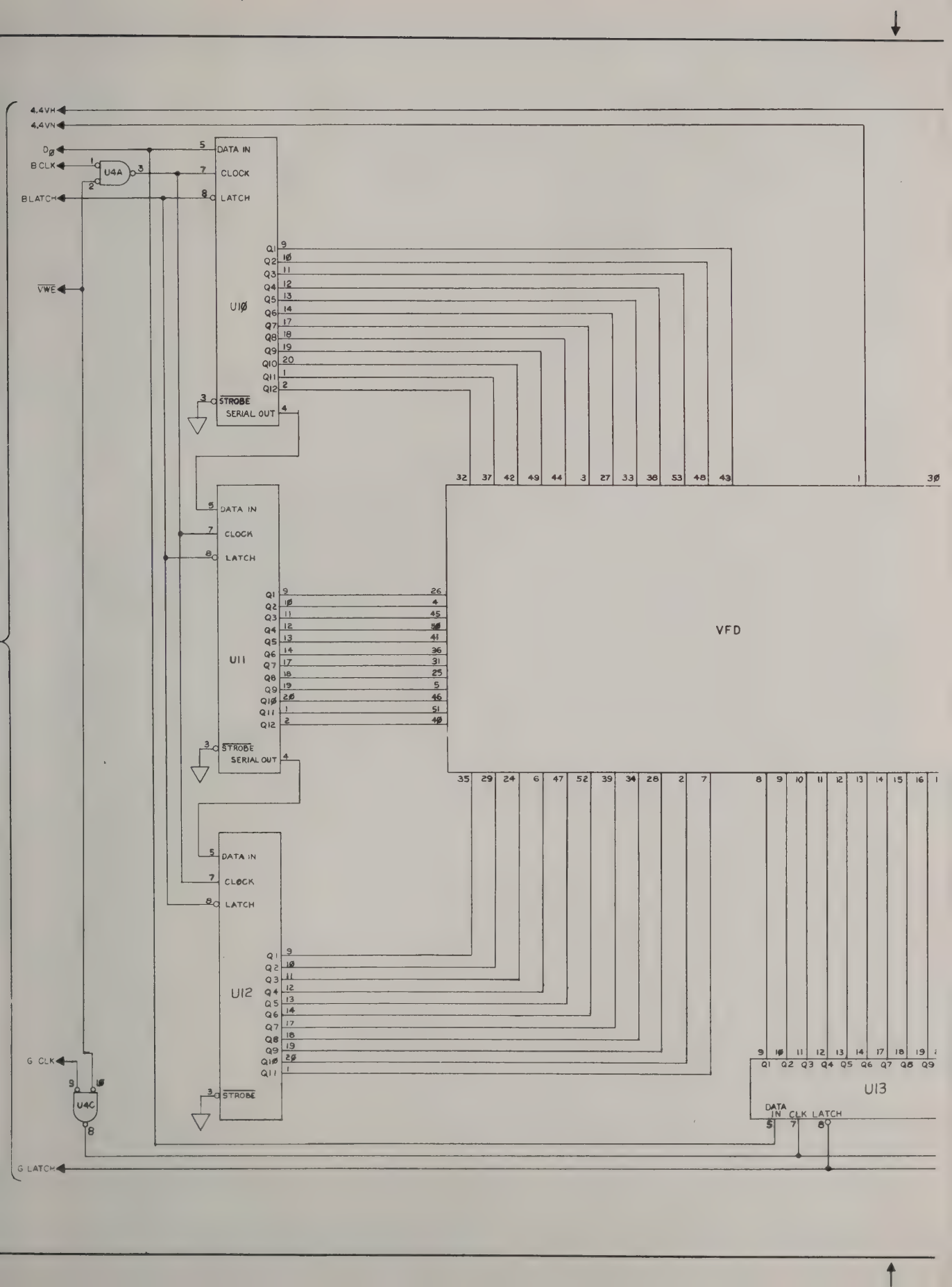
DEVICE	VCC	GND	COMMENTS
74HC138	16	8	
8279	40	20	
74HC32	14	7	
74HC273	20	10	
74LS240	20	10	
74C922	18	9	
74HC [illegible]3	16	8	→ 0V.
74HC244	20	10	1,19 → 0V.
75512	6	15	16 +20V



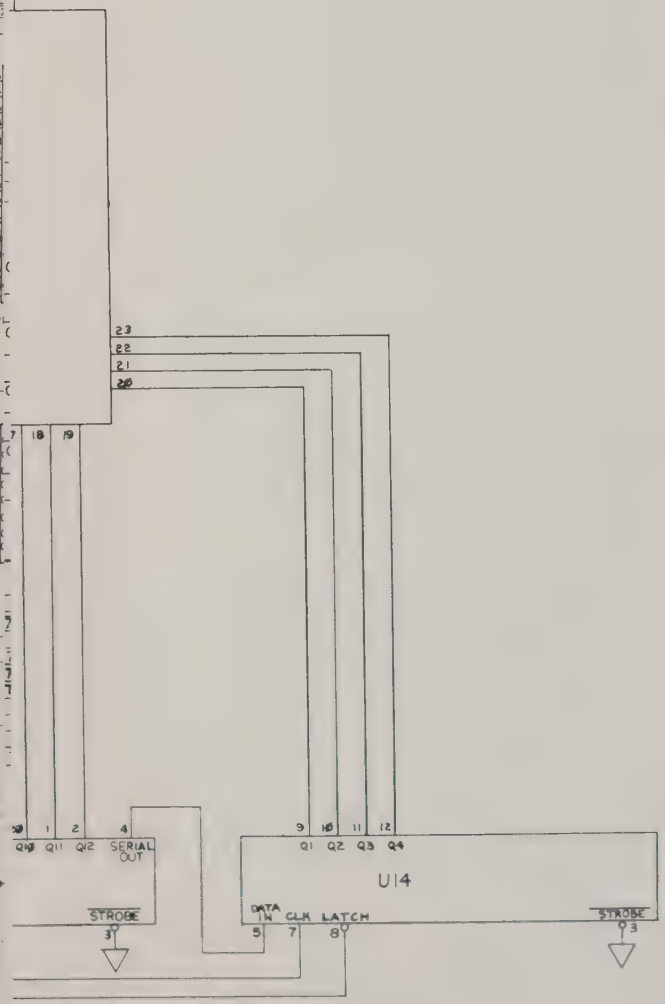
897783-1

BOARD ASS'Y, KEYBOARD 897783

BY CZECH	DATE 5.19.86	NAME SCHEMATIC	Gould Inc Instruments Division Cleveland, Ohio, 44114 U.S.A.
CH [illegible]	11/86	CODE IDENT 96795	SIZE G
			DWG NO 297783 SHT. 1 OF 3


4.4VH
4.4VN
DØ
BCLK
BLATCH
U4A
VWE
U1Ø
DATA IN
CLOCK
LATCH
STROBE
SERIAL OUT
U11
U12
U13
VFD
G CLK
U4C
G LATCH

REVISIONS		
SYM	DESCRIPTION	DATE



897783-1

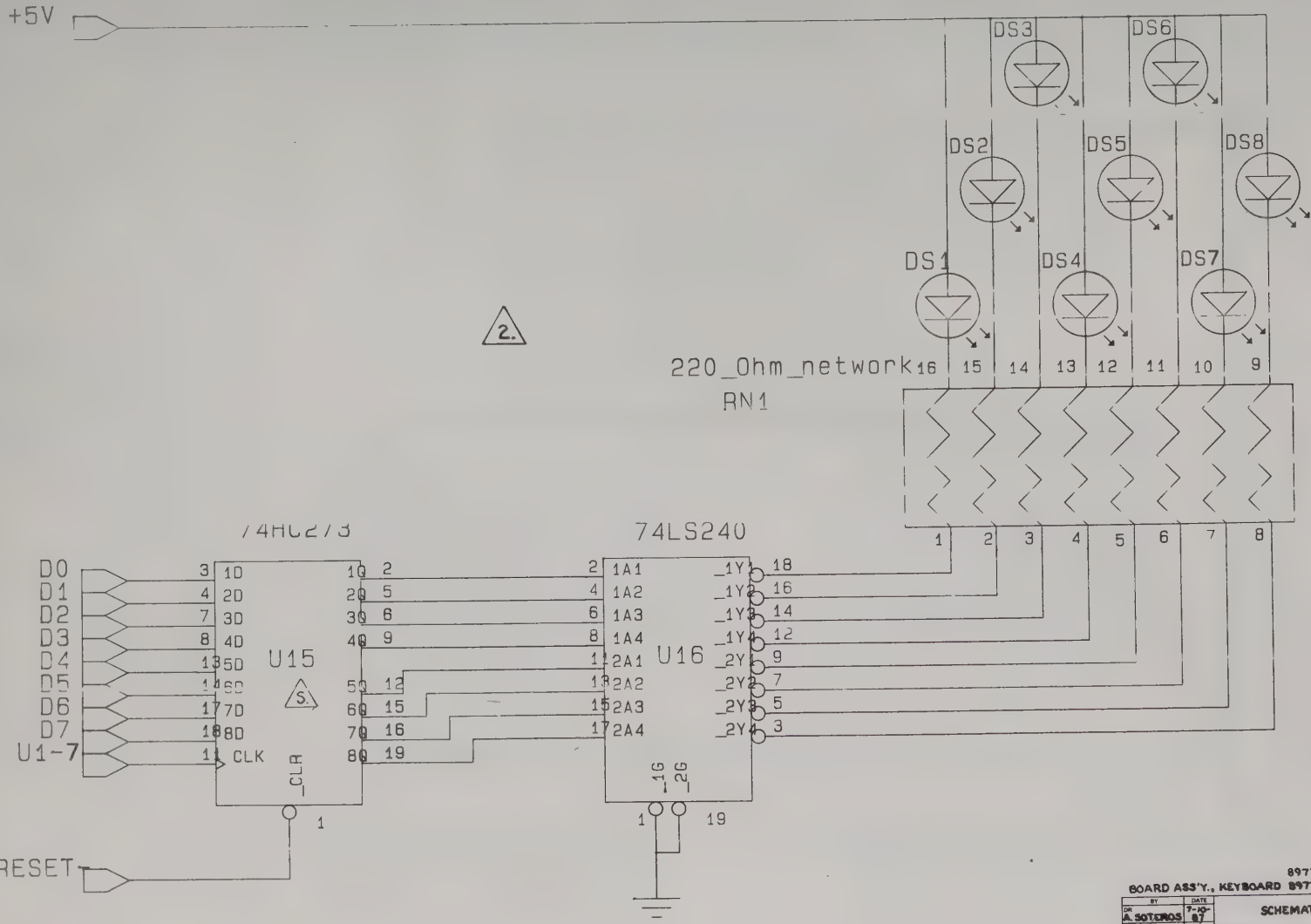
BOARD ASS'Y, KEYBOARD 897783

BY	DATE	NAME	Gould Inc. Instruments Division Cleveland, Ohio 44114 U.S.A.
DR CZECH	5-19-86	SCHEMATIC	
CH	11/26		DWG NO 297783
	11/26	CODE IDENT 96795 ISSUE CODE G	SHT. 2 OF 3

297783

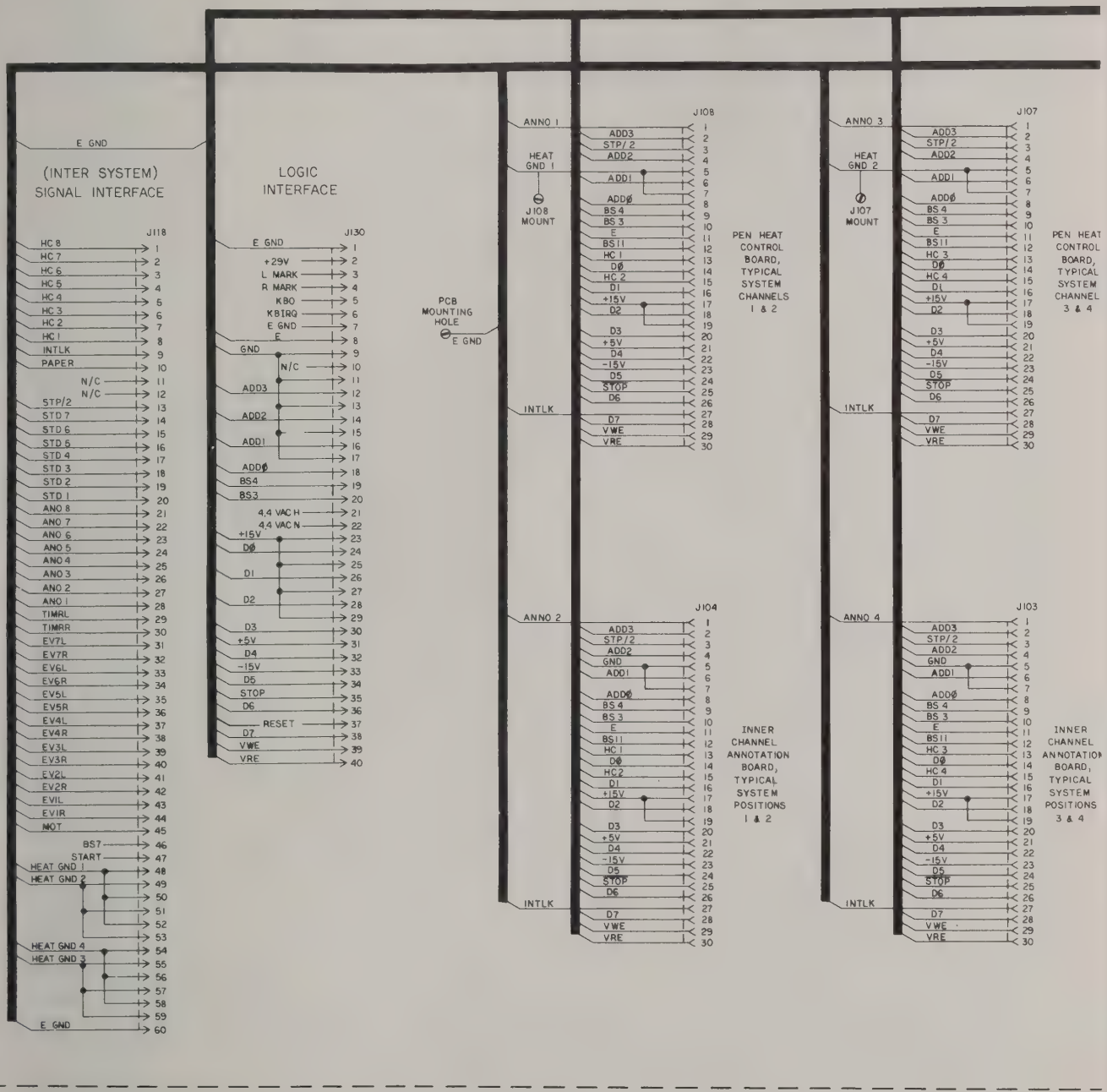
X7

REVISIONS		
SYM.	DESCRIPTION	DATE

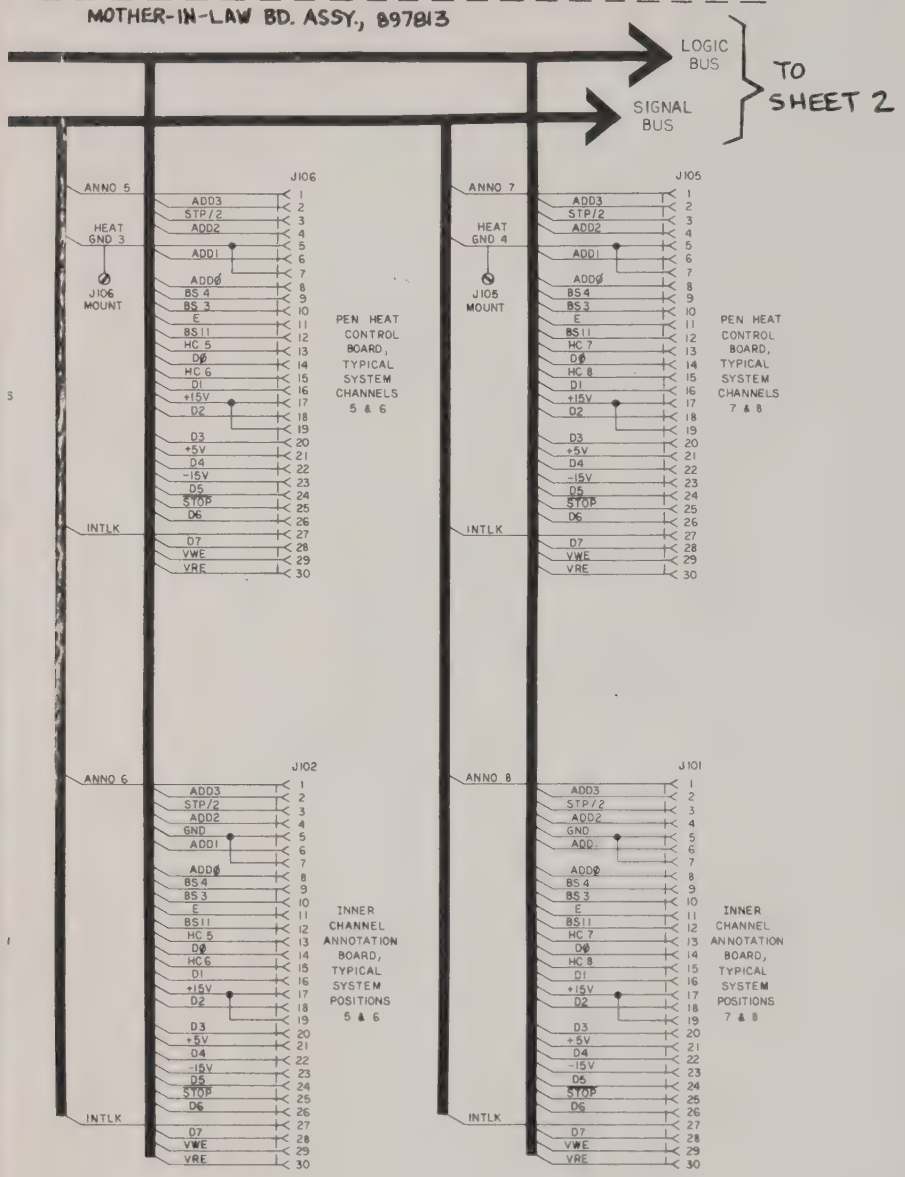


897783-1
BOARD ASS'Y., KEYBOARD 897783

BY	DATE		
CH A. SOTEROS	9-10-87	SCHEMATIC	GOULD INC. RECORDING SYS. DIV. Cleveland, Ohio 44114 U.S.A.
CH		CODE IDENT 96795	ISSUE CODE G
APP KRAIZEL	9 JUL 87		DWG NO 297783 SHEET 3 OF 3


(INTER SYSTEM)
SIGNAL INTERFACE
LOGIC
INTERFACE
E GND
J118
HC 8 1
HC 7 2
HC 6 3
HC 5 4
HC 4 5
HC 3 6
HC 2 7
HC 1 8
INTLK 9
PAPER 10
N/C 11
N/C 12
STP/2 13
STD 7 14
STD 6 15
STD 5 16
STD 4 17
STD 3 18
STD 2 19
STD 1 20
ANO 8 21
ANO 7 22
ANO 6 23
ANO 5 24
ANO 4 25
ANO 3 26
ANO 2 27
ANO 1 28
TIMRL 29
TIMRR 30
EV7L 31
EV7R 32
EV6L 33
EV6R 34
EV5L 35
EV5R 36
EV4L 37
EV4R 38
EV3L 39
EV3R 40
EV2L 41
EV2R 42
EVIL 43
EVIR 44
NOT 45
BS7 46
START 47
HEAT GND 1 48
HEAT GND 2 49
50
51
52
53
HEAT GND 4 54
HEAT GND 3 55
56
57
58
59
E GND 60
J130
E GND 1
+29V 2
L MARK 3
R MARK 4
KBO 5
KBIRQ 6
E GND 7
E 8
GND 9
N/C 10
11
ADD3 12
13
ADD2 14
15
ADD1 16
17
ADDØ 18
BS4 19
BS3 20
4,4 VAC H 21
4,4 VAC N 22
+15V 23
DØ 24
25
D1 26
27
D2 28
29
D3 30
+5V 31
D4 32
-15V 33
D5 34
STOP 35
D6 36
RESET 37
D7 38
VWE 39
VRE 40
PCB
MOUNTING
HOLE
E GND
ANNO 1
HEAT
GND 1
J108
MOUNT
INTLK
ANNO 2
INTLK
J108
ADD3 1
STP/2 2
ADD2 3
4
ADD1 5
6
7
ADDØ 8
BS 4 9
BS 3 10
E 11
BS11 12
HC 1 13
DØ 14
HC 2 15
D1 16
+15V 17
D2 18
19
D3 20
+5V 21
D4 22
-15V 23
D5 24
STOP 25
D6 26
27
D7 28
VWE 29
VRE 30
PEN HEAT
CONTROL
BOARD,
TYPICAL
SYSTEM
CHANNELS
1 & 2
J104
ADD3 1
STP/2 2
ADD2 3
GND 4
ADD1 5
6
7
ADDØ 8
BS 4 9
BS 3 10
E 11
BS11 12
HC 1 13
DØ 14
HC 2 15
D1 16
+15V 17
D2 18
19
D3 20
+5V 21
D4 22
-15V 23
D5 24
STOP 25
D6 26
27
D7 28
VWE 29
VRE 30
INNER
CHANNEL
ANNOTATION
BOARD,
TYPICAL
SYSTEM
POSITIONS
1 & 2
ANNO 3
HEAT
GND 2
J107
MOUNT
INTLK
ANNO 4
INTLK
J107
ADD3 1
STP/2 2
ADD2 3
4
ADD1 5
6
7
ADDØ 8
BS 4 9
BS 3 10
E 11
BS11 12
HC 3 13
DØ 14
HC 4 15
D1 16
+15V 17
D2 18
19
D3 20
+5V 21
D4 22
-15V 23
D5 24
STOP 25
D6 26
27
D7 28
VWE 29
VRE 30
PEN HEAT
CONTROL
BOARD,
TYPICAL
SYSTEM
CHANNEL
3 & 4
J103
ADD3 1
STP/2 2
ADD2 3
GND 4
ADD1 5
6
7
ADDØ 8
BS 4 9
BS 3 10
E 11
BS11 12
HC 3 13
DØ 14
HC 4 15
D1 16
+15V 17
D2 18
19
D3 20
+5V 21
D4 22
-15V 23
D5 24
STOP 25
D6 26
27
D7 28
VWE 29
VRE 30
INNER
CHANNEL
ANNOTATION
BOARD,
TYPICAL
SYSTEM
POSITIONS
3 & 4

REVISIONS		
SYM	DESCRIPTION	DATE
J	REVISED PER DCN 34426/A. SOTEROS	10-1-87

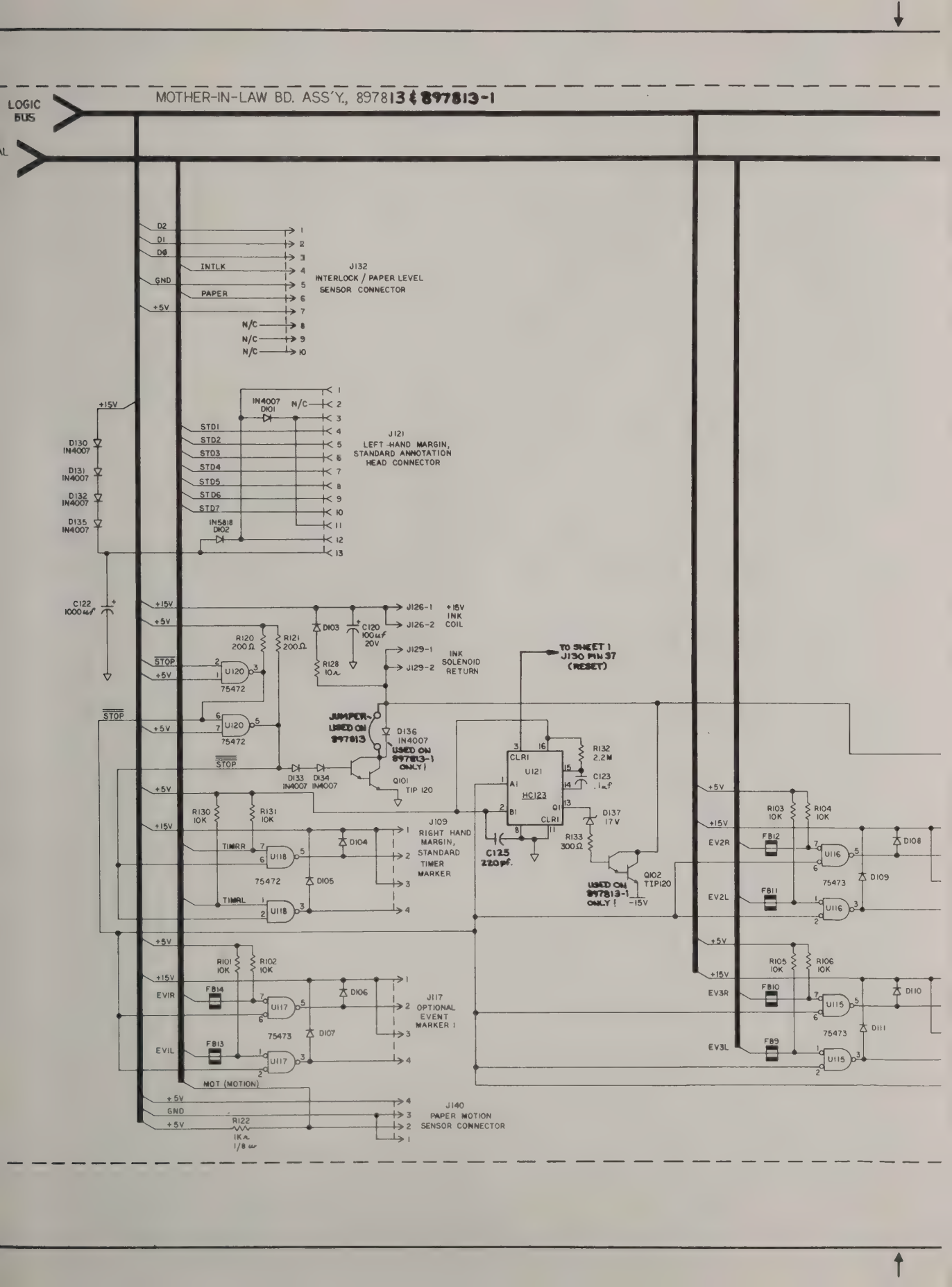


BOARD ASSY, MOTHER-IN-LAW 897813

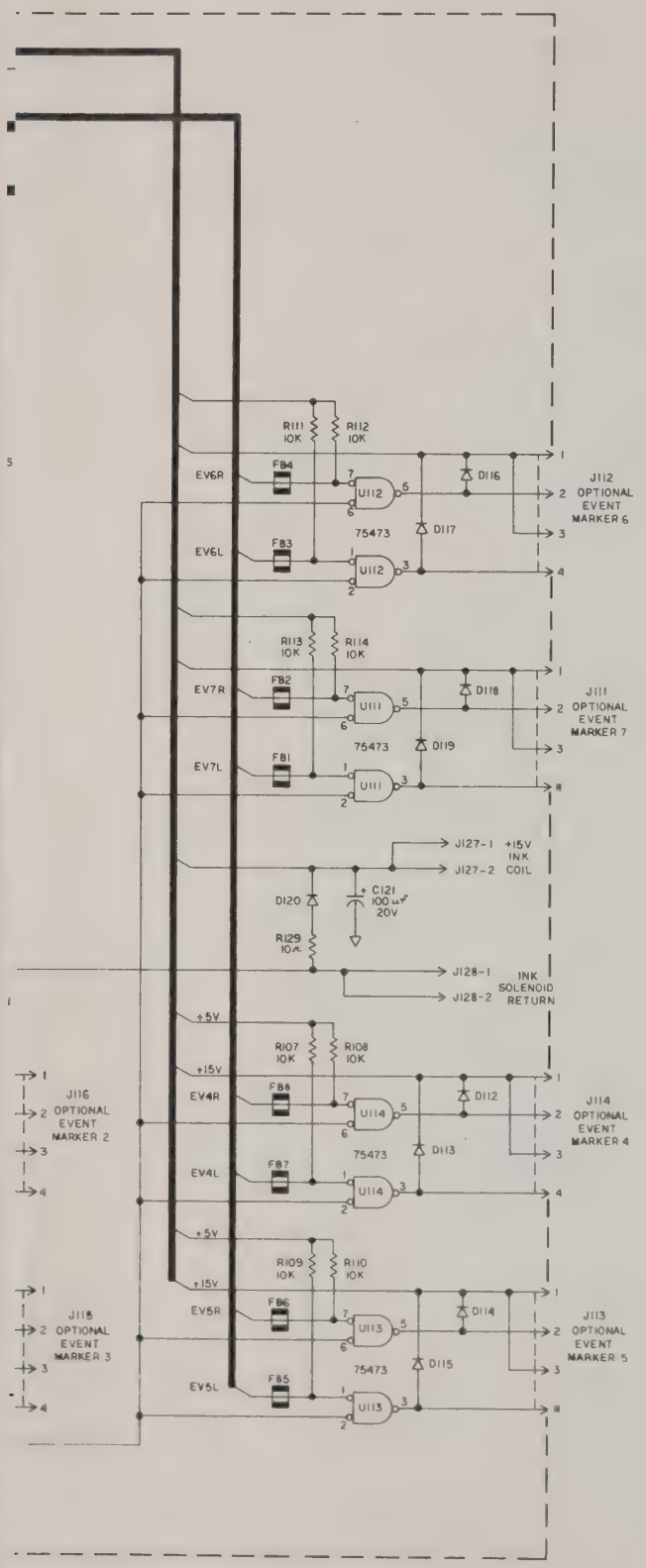
BY	DATE
DR BRENNOOR	11-86
CH Swartz	12-86
EO Dorn	3-10-87

NAME	SCHEMATIC
CODE IDENT	96795
ISSUE CODE	G

Gould Inc.
Instruments Division
Cleveland, Ohio 44114 U.S.A.
DWG NO 297813
SHEET 1 OF 2


LOGIC BUS
D2
D1
D0
INTLK
GND
PAPER
+5V
N/C
N/C
N/C
J132
INTERLOCK / PAPER LEVEL SENSOR CONNECTOR
+15V
IN4007 D101
STD1
STD2
STD3
STD4
STD5
STD6
STD7
IN5818 D102
J121
LEFT-HAND MARGIN, STANDARD ANNOTATION HEAD CONNECTOR
D130 IN4007
D131 IN4007
D132 IN4007
D135 IN4007
C122 1000µf
J126-1 +15V INK COIL
J126-2
J129-1 INK SOLENOID RETURN
J129-2
D103
C120 100µf 20V
R120 200Ω
R121 200Ω
R128 10Ω
STOP
U120
75472
TO SHEET 1 J130 PIN 37 (RESET)
JUMPER USED ON 897813
D136 IN4007 USED ON 897813-1 ONLY!
Q101 TIP 120
D133 IN4007
D134 IN4007
U121 HC123
CLR1
A1
B1
Q1
CLR1
R132 2.2M
C123 .1µf
D137 17V
R133 300Ω
C125 220pf.
Q102 TIP120
USED ON 897813-1 ONLY!
-15V
R130 10K
R131 10K
TIMRR
TIMRL
U118
D104
D105
75472
J109 RIGHT HAND MARGIN, STANDARD TIMER MARKER
R101 10K
R102 10K
EVIR
EVIL
FB14
FB13
U117
D106
D107
75473
J117 OPTIONAL EVENT MARKER 1
MOT (MOTION)
GND
R122 1KΩ 1/8 w
J140 PAPER MOTION SENSOR CONNECTOR
R103 10K
R104 10K
EV2R
EV2L
FB12
FB11
U116
D108
D109
75473
R105 10K
R106 10K
EV3R
EV3L
FB10
FB9
U115
D110
D111
75473

REVISIONS J		
SYM.	DESCRIPTION	DATE

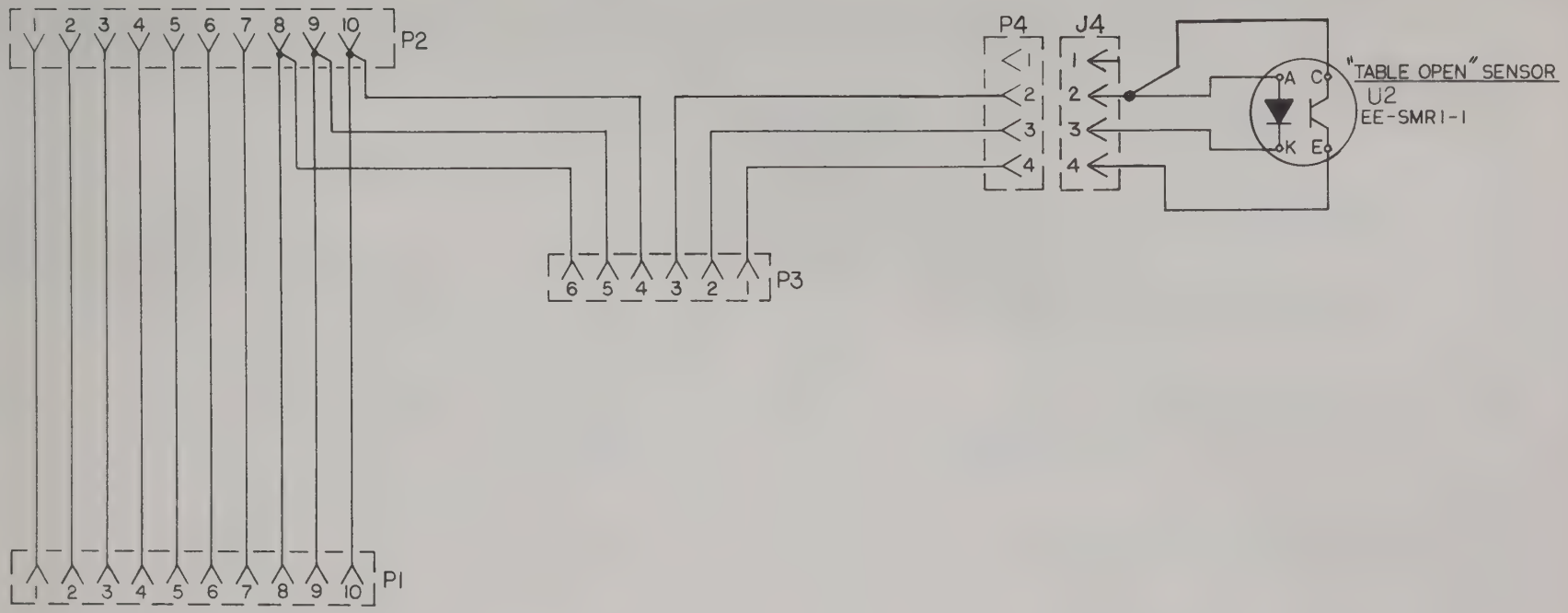


897813-1
BOARD ASS'Y., MOTHER-N-LAW 897813

BY	DATE	NAME	Gould Inc. Instruments Division Cleveland, Ohio 44114 U.S.A.
DR BREMENOUR	11-86	SCHEMATIC	
CH H. SWARTZ	12-15-86		DWG. NO. 297813
APP J.C. Arnold	2-12-87	CODE IDENT 96795 / ISSUE CODE G	SHEET 2 OF 2

REVISIONS		
SYM	DESCRIPTION	DATE
A	REVISED PER DCN 34467	8-1-87

PHOTO SENSOR CABLE ASSEMBLY 897912



297912

CABLE ASSY., PHOTO SENSOR 897912

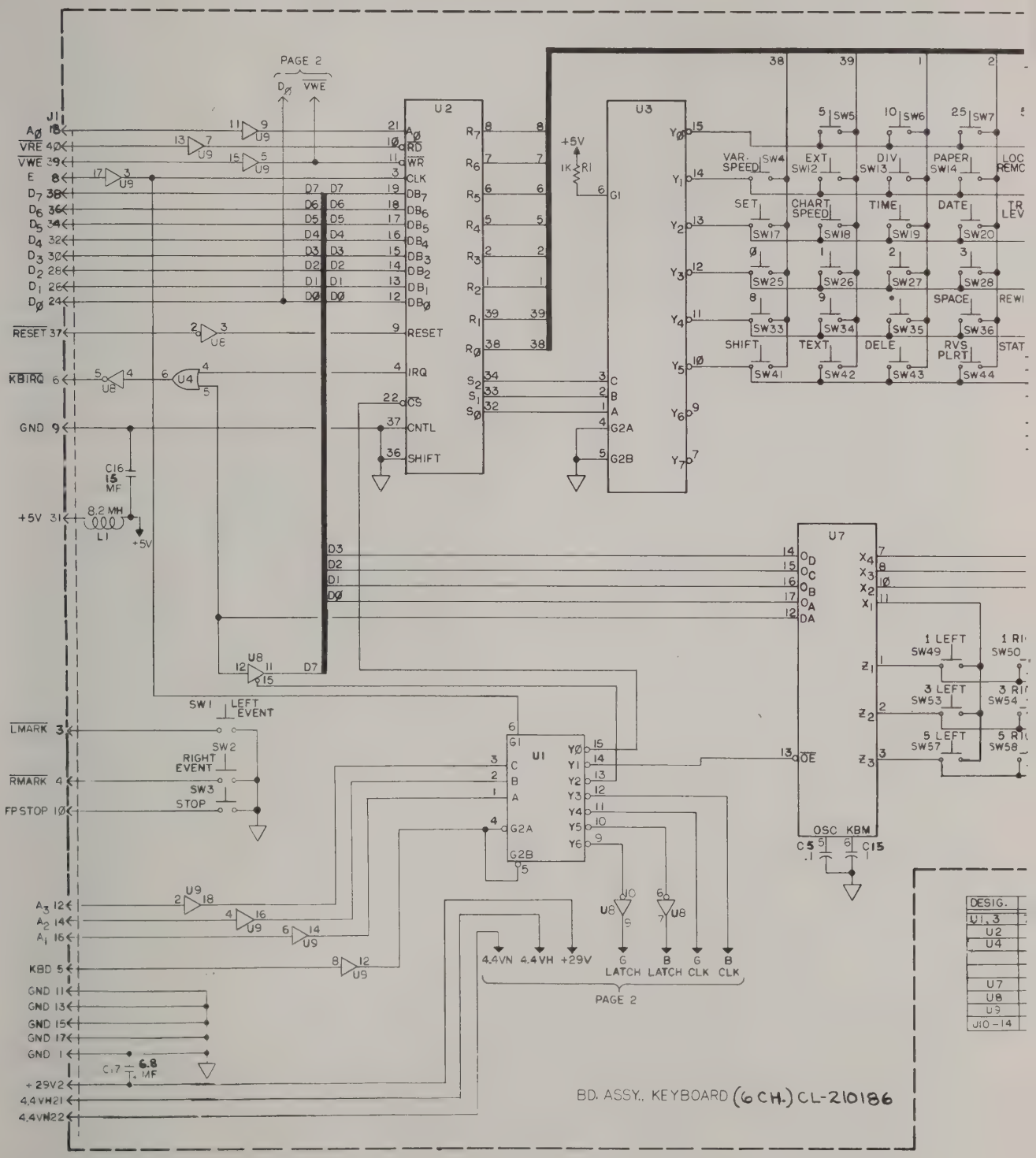
	BY	DATE
DR	J. KOCHIS	9-86
CH	Awanty	11-86
APP	F. ZAFF	11/26

NAME: SCHEMATIC

96795 — ISSUE CODE: G

Gould Inc.
Instruments Division
Cleveland, Ohio 44114 U.S.A.

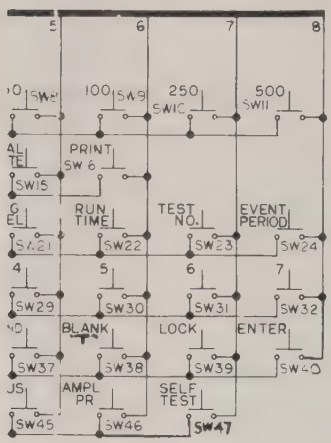
DWG. NO. 297912

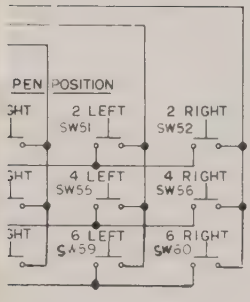


DESIG.
U1, 3
U2
U4
U7
U8
U9
U10 - 14

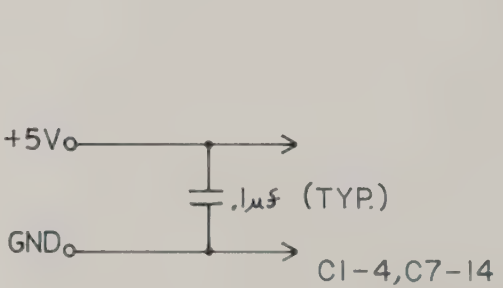
NOTE: UNLESS OTHERWISE INDICATED:
ALL CAPACITANCE IN MICROFARADS.
ALL RESISTANCE IN OHMS.
ALL RESISTORS .15 WATT, 2%.

REVISIONS		
SYM	DESCRIPTION	DATE
F-1	NOT AFFECTED PER DCN 34298/A SOTEROS	6-22-87



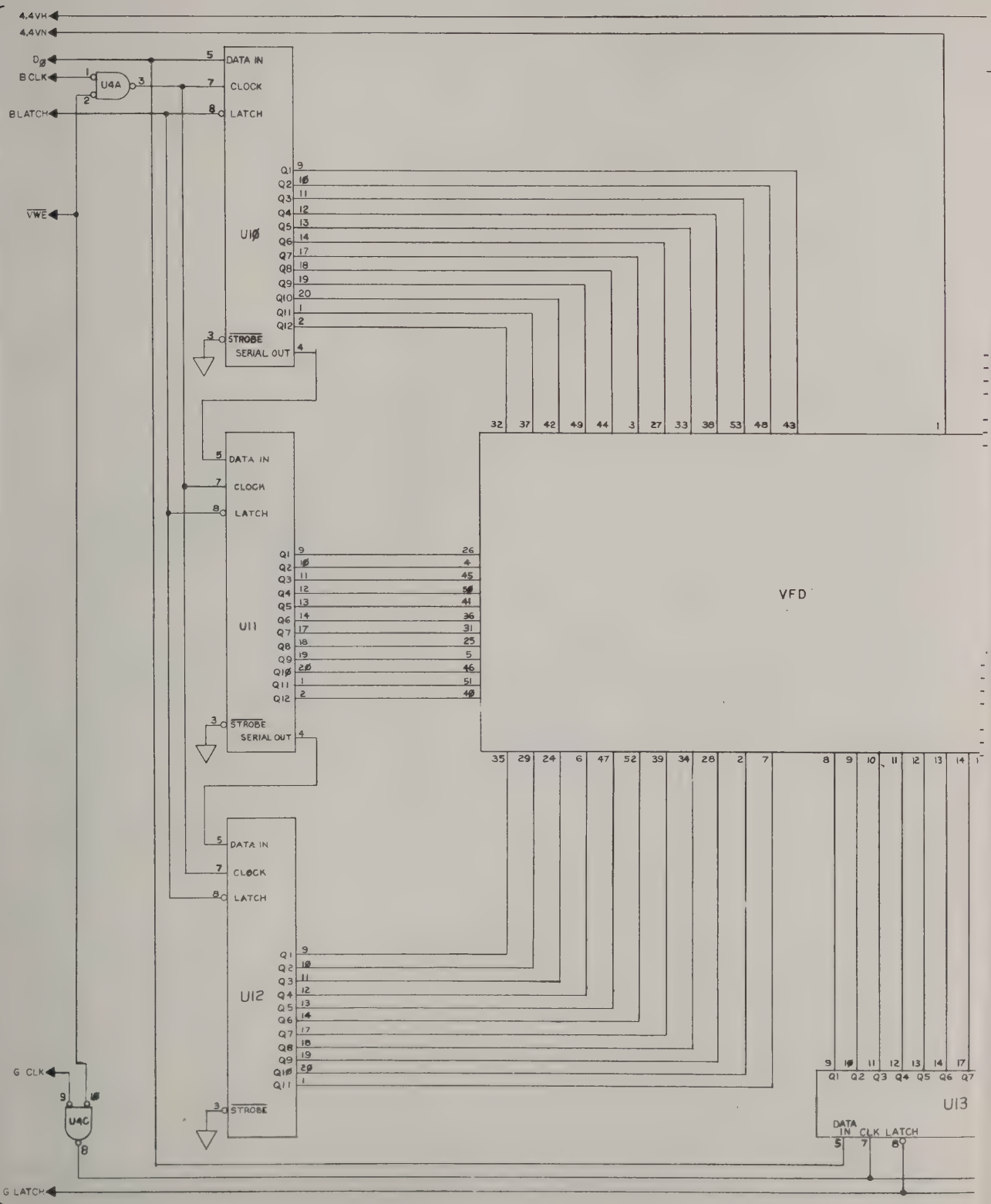


DEVICE	VCC	GND	COMMENTS
74HC138	16	8	
8279	40	20	
74HC32	14	7	
74C922	18	9	
74HC368	16	8	1 → 0V
74HC244	20	10	1,19 → 0V
75512	6	15	16 +29V

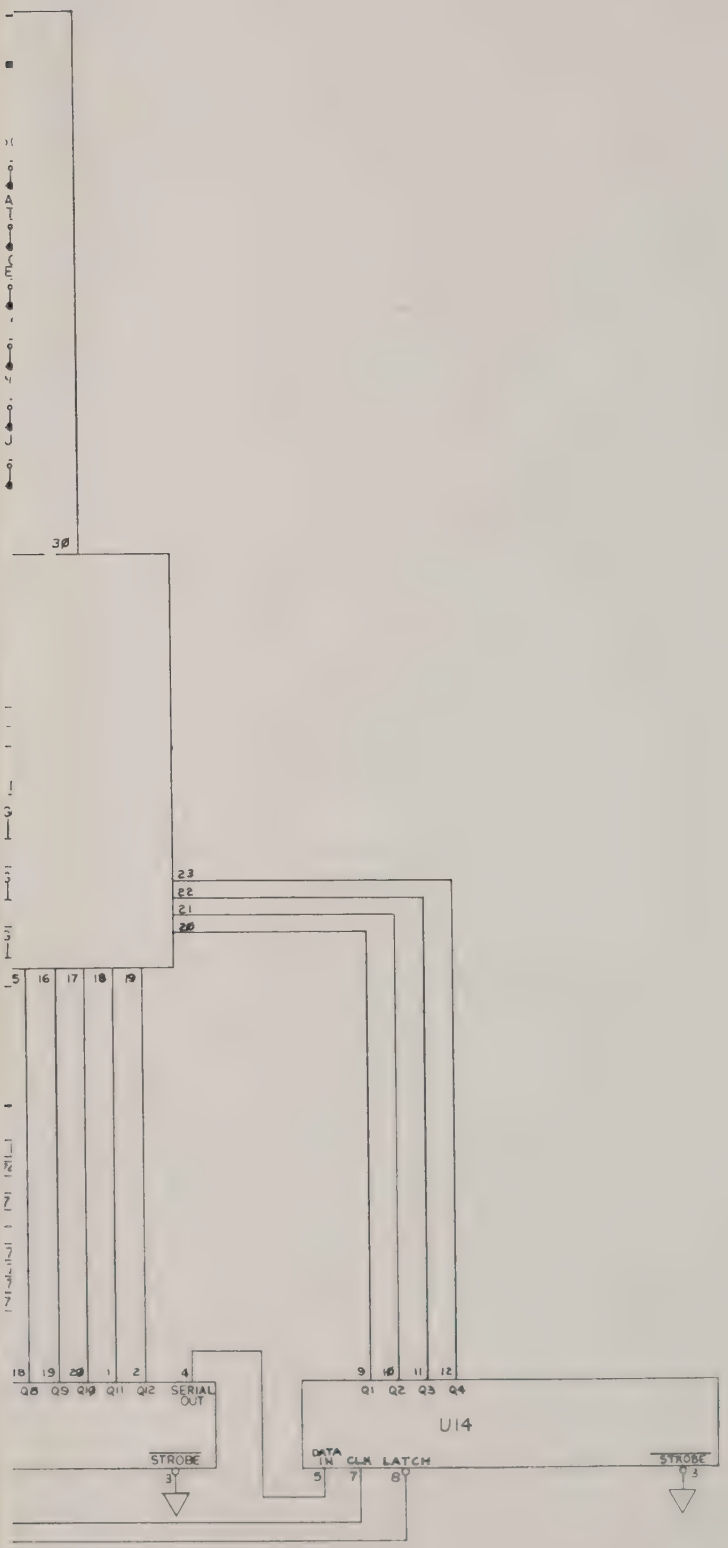


BOARD ASS'Y, KEYBOARD CL-810186

BY	DATE	NAME	Gould Inc. Instruments Division
CZECH	5-19-86	SCHEMATIC	Cleveland, Ohio 44114 U.S.A.
Dunaj	11/86	CODE IDENT 96795	DWG NO CL-210186
			SHT. 1 OF 2


4.4VH
4.4VN
DØ
BCLK
BLATCH
VWE
U4A
U1Ø
U11
U12
U13
U4C
DATA IN
CLOCK
LATCH
STROBE
SERIAL OUT
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
VFD
G CLK
G LATCH
PAGE 1

REVISIONS		
SYM	DESCRIPTION	DATE



BOARD ASS'Y, KEYBOARD CL-810186

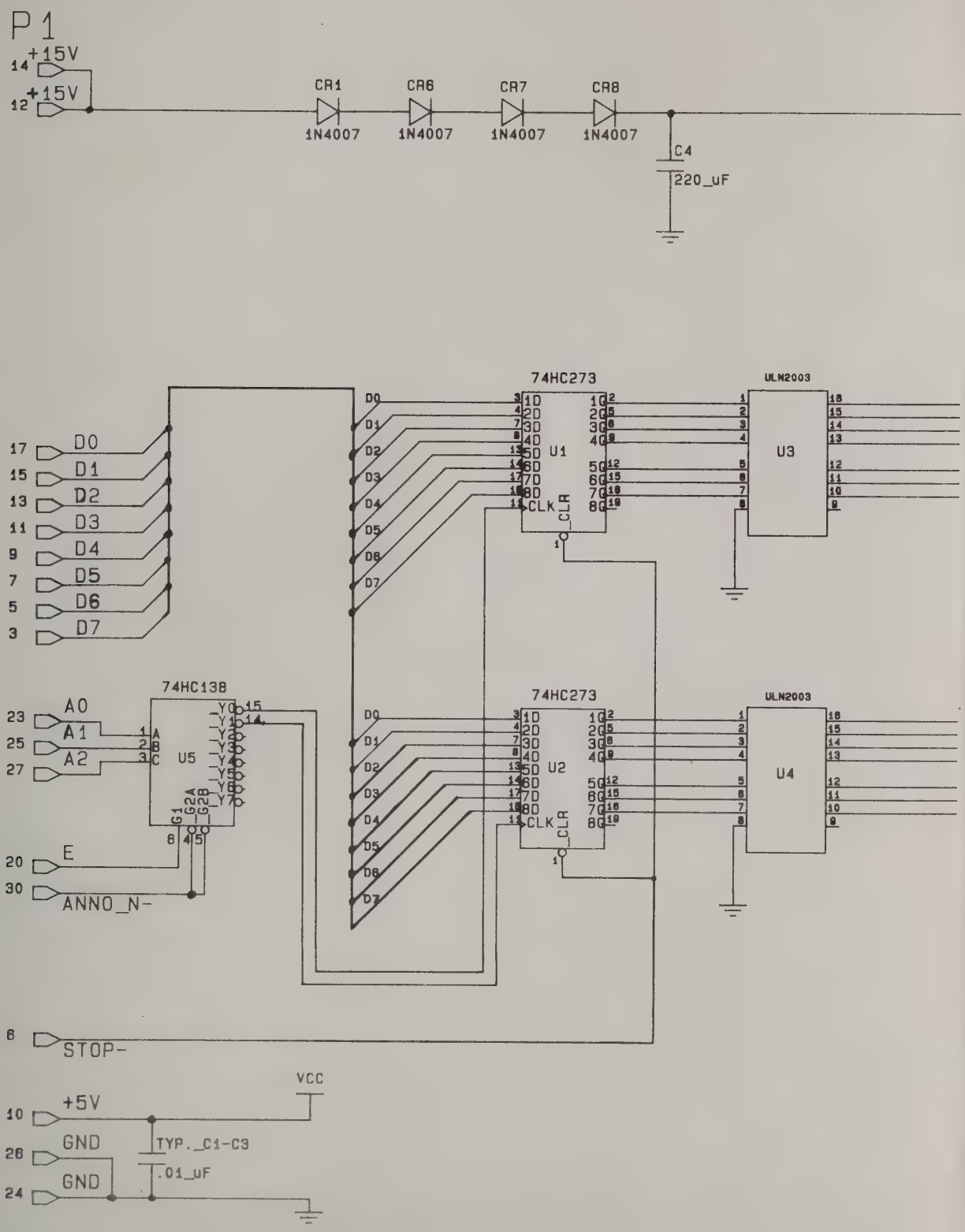
BY	DATE
CZECH	5-9-86
	11/86
	11/86

NAME: SCHEMATIC

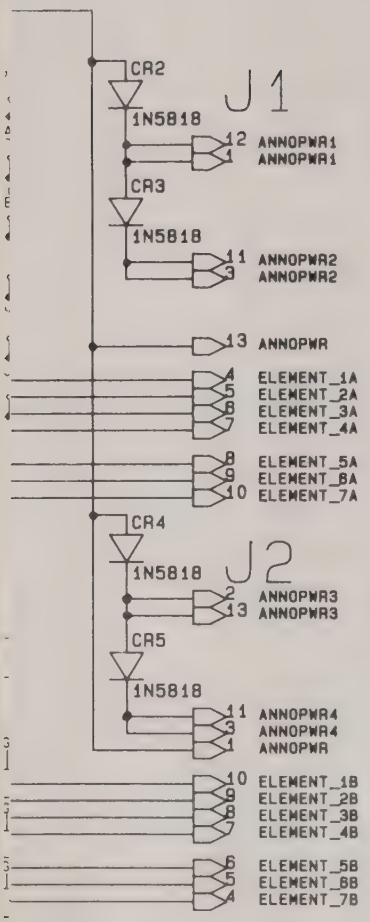
CODE IDENT: 96795 ISSUE CODE: G

Gould Inc
Instruments Division
Cleveland, Ohio, 44114 U.S.A.

DWG NO: CL-210186
SHT. 2 OF 2


P1
14 +15V
12 +15V
CR1
1N4007
CR6
1N4007
CR7
1N4007
CR8
1N4007
C4
220_uF
74HC273
U1
ULN2003
U3
74HC273
U2
ULN2003
U4
74HC138
U5
17 D0
15 D1
13 D2
11 D3
9 D4
7 D5
5 D6
3 D7
23 A0
25 A1
27 A2
20 E
30 ANNO_N-
6 STOP-
10 +5V
26 GND
24 GND
VCC
TYP._C1-C3
.01_uF

REVISIONS		
SYM	DESCRIPTION	DATE
E	ORIGINAL RELEASE DCN 33755 SWARTZ	12-29-86



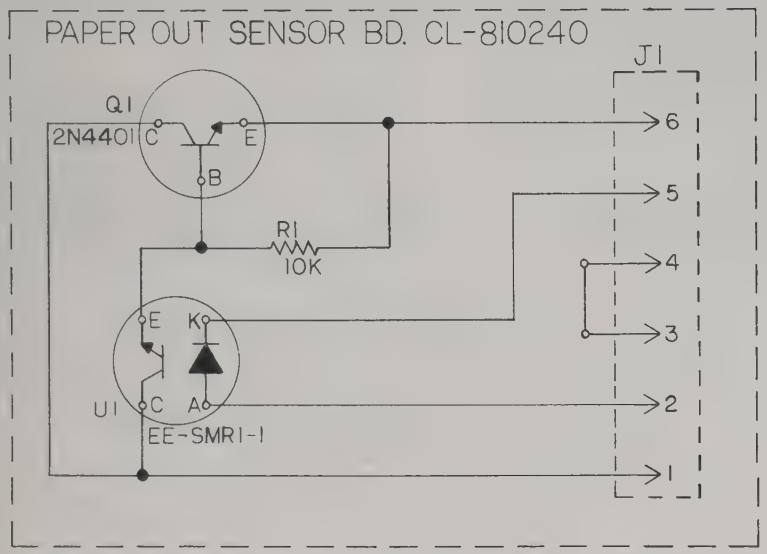
DESCRIPTION	DEVICE	+5V	GND
U1, U2	74HC273	20	10
U5	74HC138	16	8

BOARD ASS'Y.,
INTERCHANNEL ANNOTATION CL-810191

BY	DATE	NAME	Gould Inc. Instruments Division Cleveland Ohio 44114 U.S.A.
KRAIZEL	10-86	SCHEMATIC	
A. Swartz	12-29-86		
KRAIZEL	31-DEC-86	CODE IDENT 96795	DWG NO. CL-210191
		ISSUE CODE G	

CL-210191

REVISIONS		
SYM	DESCRIPTION	DATE
G	NOT AFFECTED IXN 39368 CLAIM	8-28-87

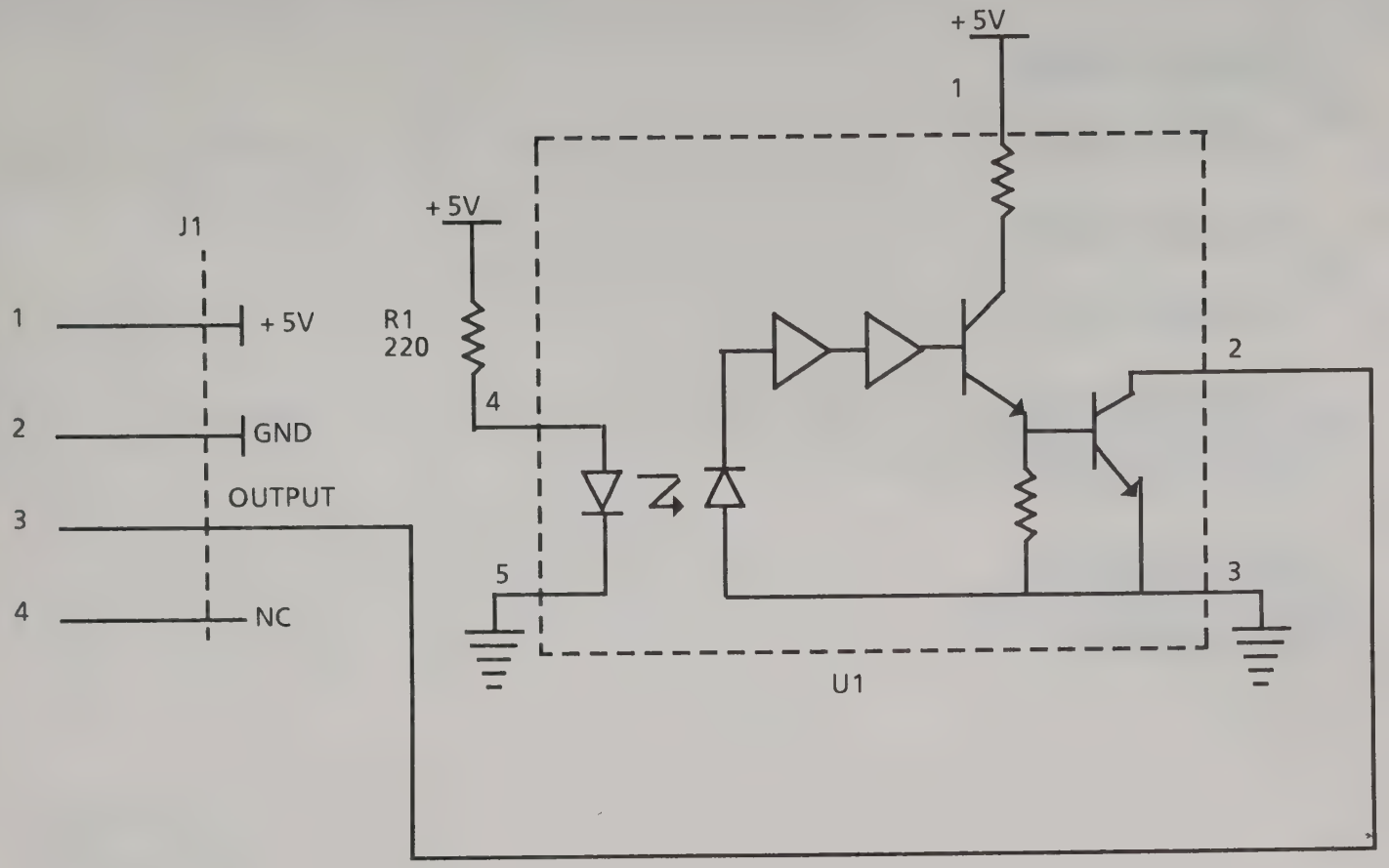


BOARD ASS'Y, PAPER OUT SENSOR CL-810240

BY	DATE	NAME
DR KOCHIS	8-28-86	SCHEMATIC
CH Swartz	11-86	
APP		

CODE IDENT. 96795 | ISSUE CODE G

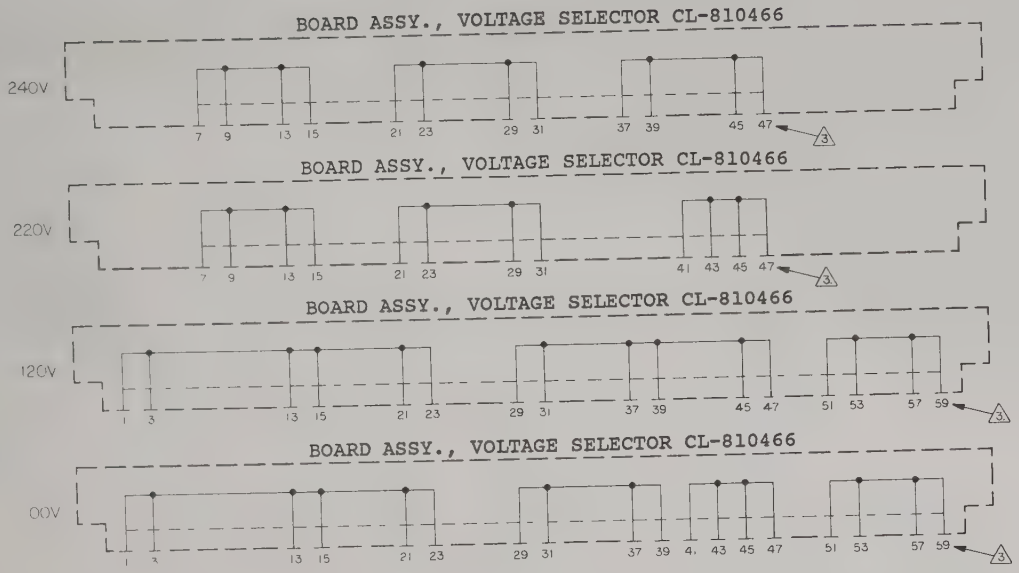
Gould Inc.
Instruments Division
Cleveland Ohio 44114 U.S.A.
DWG. NO. CL-210240

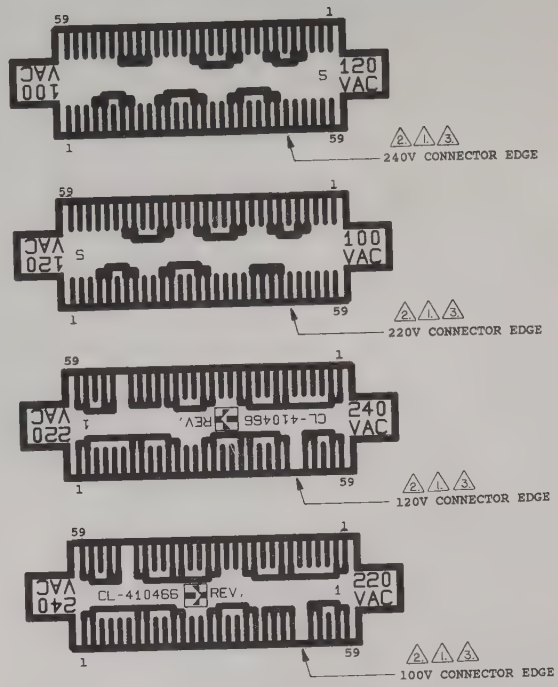


BOARD ASSY., SPEED MONITOR CL-810290

SCHEMATIC DWG. NO. CL-210290

REVISIONS			
SYM	DESCRIPTION		DATE
D	ORIGINAL RELEASE ISSUE DCN. 34236 J. KOCHIS		5-28-87





3. PIN NUMBERS SHOWN ARE ON THE MATING CONNECTOR AND ARE SHOWN HERE FOR REFERENCE ONLY.

2. SILKSCREEN VOLTAGE NUMBERS (100VAC,120VAC,220VAC,240VAC) CORROSPONDING TO THE CONNECTOR EDGES ARE ON THE REVERSE SIDE OF THE P.C. BOARD.

1. P.C. BOARD SHOWN FOR REFERENCE ONLY.

NOTES:

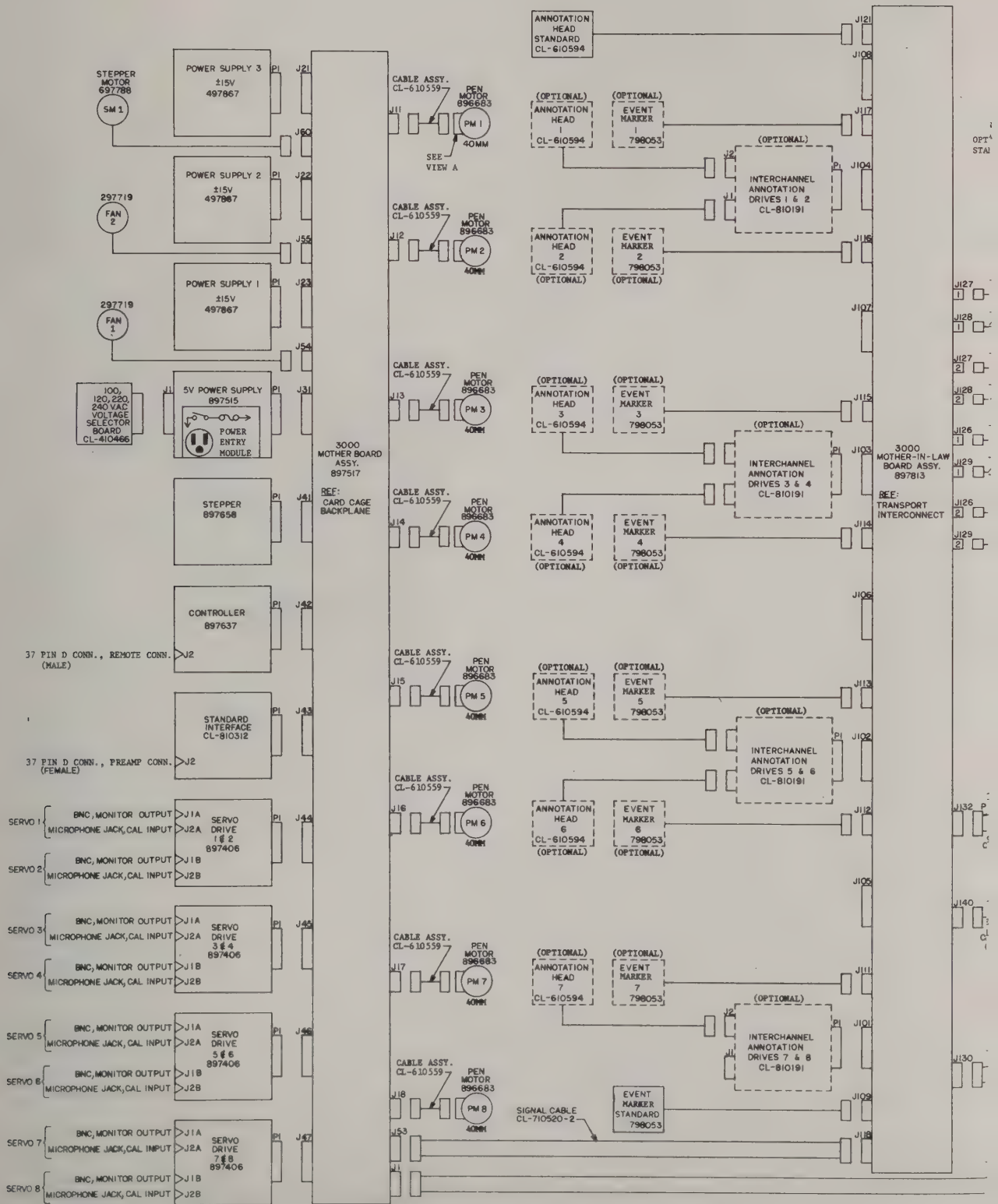
BOARD ASSY, VOLTAGE SELECTOR CL-810466

BY	DATE	NAME
DR J. KOCHIS	5-27-87	SCHEMATIC
CH Dan Smith	5-27-87	
APP	5-27-87	

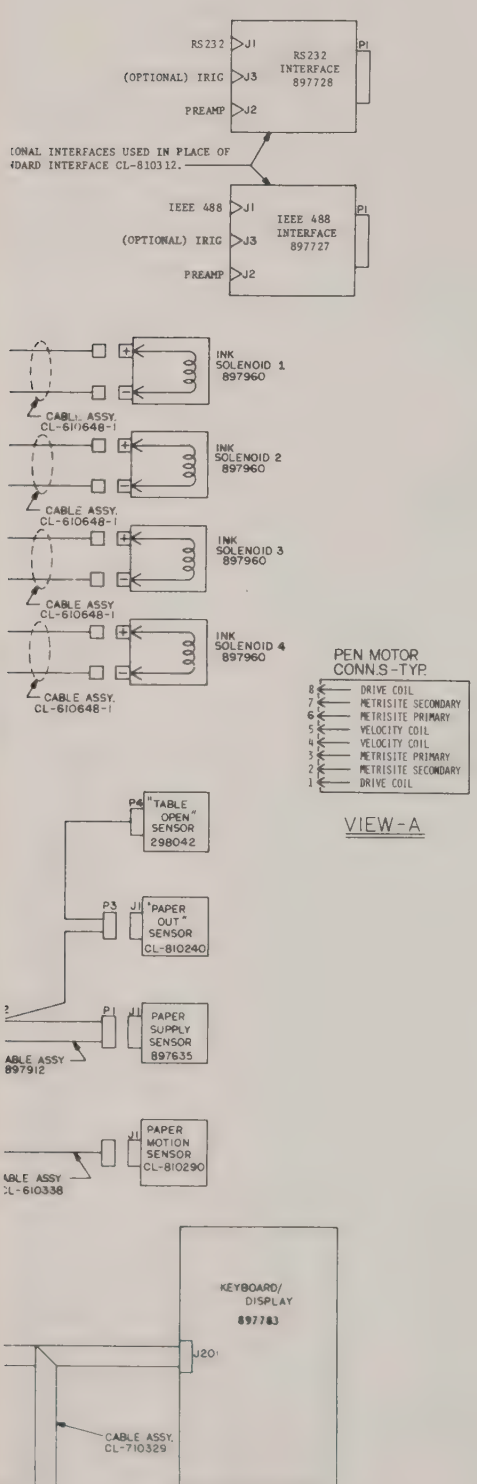
CODE IDENT 96795 | ISSUE CODE G

Gould Inc.
Instruments Division
Cleveland Ohio 44114 U.S.A.
DWG. NO. CL-210466

CL-210466


STEPPER MOTOR 697788 SM 1
POWER SUPPLY 3 ±15V 497867
297719 FAN 2
POWER SUPPLY 2 ±15V 497867
297719 FAN 1
POWER SUPPLY 1 ±15V 497867
100, 120, 220, 240 VAC VOLTAGE SELECTOR BOARD CL-610466
5V POWER SUPPLY 897515
POWER ENTRY MODULE
STEPPER 897658
CONTROLLER 897637
37 PIN D CONN., REMOTE CONN. (MALE)
STANDARD INTERFACE CL-810312
37 PIN D CONN., PREAMP CONN. (FEMALE)
SERVO 1
SERVO 2
SERVO 3
SERVO 4
SERVO 5
SERVO 6
SERVO 7
SERVO 8
BNC, MONITOR OUTPUT
MICROPHONE JACK, CAL INPUT
SERVO DRIVE 1 & 2 897406
SERVO DRIVE 3 & 4 897406
SERVO DRIVE 5 & 6 897406
SERVO DRIVE 7 & 8 897406
3000 MOTHER BOARD ASSY. 897517
REF: CARD CAGE BACKPLANE
CABLE ASSY. CL-610559
PEN MOTOR 896683
PM 1
PM 2
PM 3
PM 4
PM 5
PM 6
PM 7
PM 8
40MM
SEE VIEW A
ANNOTATION HEAD STANDARD CL-610594
(OPTIONAL) ANNOTATION HEAD CL-610594
ANNOTATION HEAD 2 CL-610594
ANNOTATION HEAD 3 CL-610594
ANNOTATION HEAD 4 CL-610594
ANNOTATION HEAD 5 CL-610594
ANNOTATION HEAD 6 CL-610594
ANNOTATION HEAD 7 CL-610594
EVENT MARKER 798053
EVENT MARKER STANDARD 798053
INTERCHANNEL ANNOTATION DRIVES 1 & 2 CL-810191
INTERCHANNEL ANNOTATION DRIVES 3 & 4 CL-810191
INTERCHANNEL ANNOTATION DRIVES 5 & 6 CL-810191
INTERCHANNEL ANNOTATION DRIVES 7 & 8 CL-810191
SIGNAL CABLE CL-710520-2
3000 MOTHER-IN-LAW BOARD ASSY. 897813
REF: TRANSPORT INTERCONNECT

REVISIONS		
SYM	DESCRIPTION	DATE



MODEL NO. 30-V7808-00

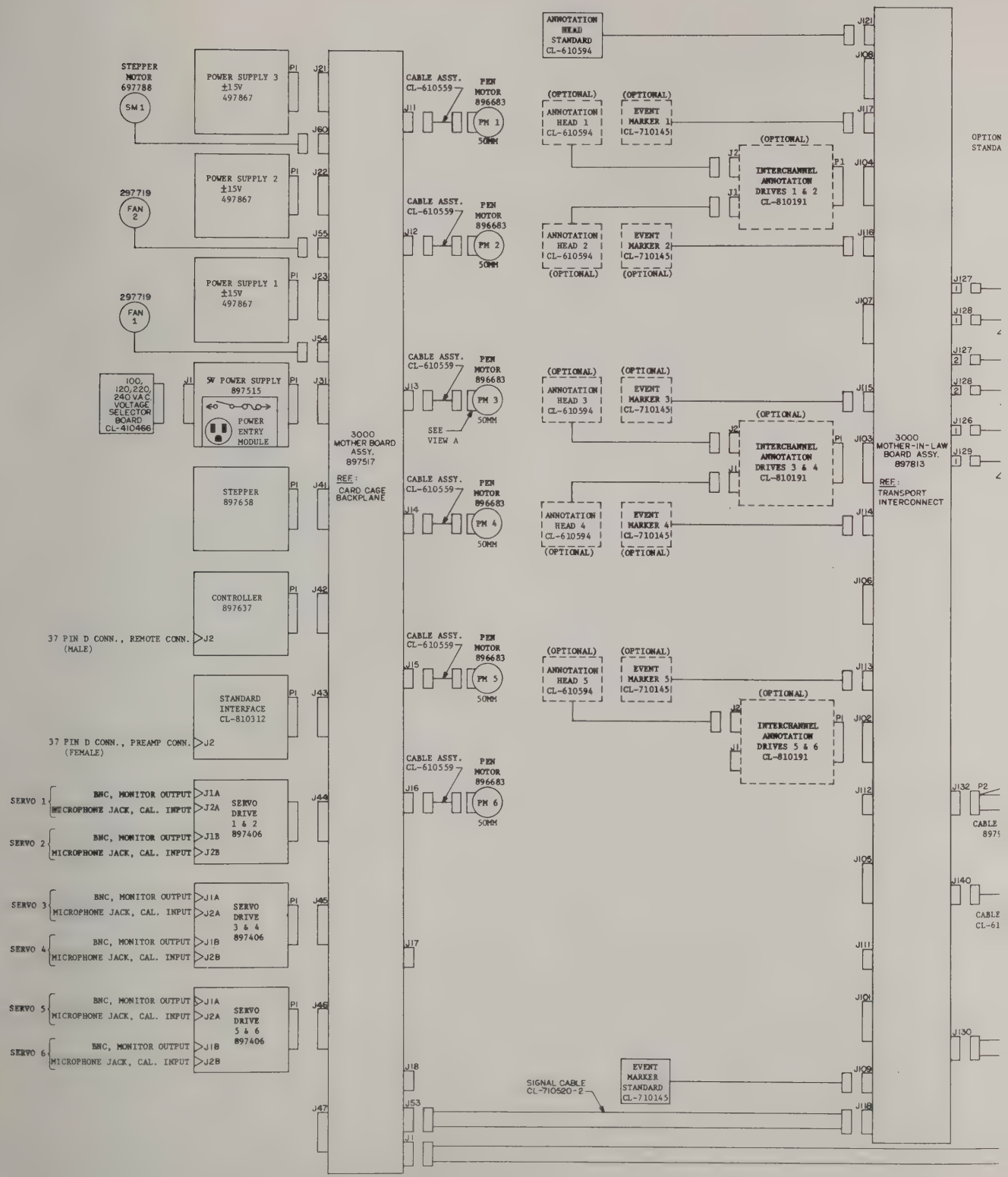
BY	DATE
DR KOCHIS	2-25-87
CH Durant	4/87
AP Good	4/87

NAME SCHEMATIC, OVERALL

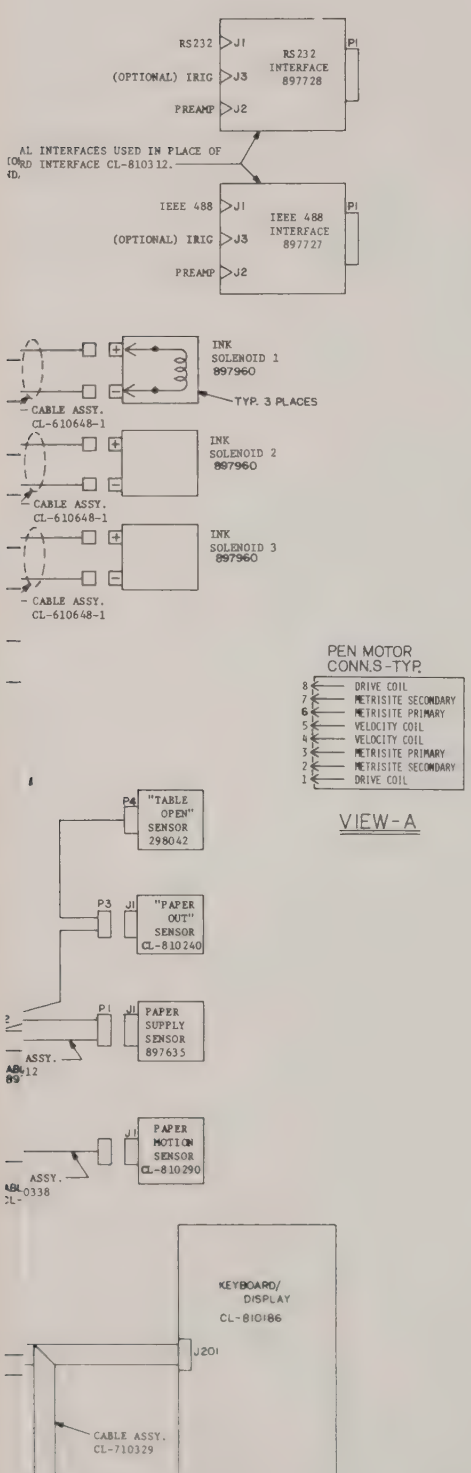
CODE IDENT 96795 | ISSUE CODE G

Gould Inc.
Instruments Division
Cleveland, Ohio 44114 U.S.A.

DWG NO CL-211529


STEPPER MOTOR 697788
SW1
POWER SUPPLY 3 ±15V 497867
297719 FAN 2
POWER SUPPLY 2 ±15V 497867
297719 FAN 1
POWER SUPPLY 1 ±15V 497867
100, 120, 220, 240 VAC VOLTAGE SELECTOR BOARD CL-410466
SW POWER SUPPLY 897515
POWER ENTRY MODULE
STEPPER 897658
CONTROLLER 897637
37 PIN D CONN., REMOTE CONN. (MALE)
STANDARD INTERFACE CL-810312
37 PIN D CONN., PREAMP CONN. (FEMALE)
SERVO 1
SERVO 2
SERVO 3
SERVO 4
SERVO 5
SERVO 6
BNC, MONITOR OUTPUT
MICROPHONE JACK, CAL. INPUT
SERVO DRIVE 1 & 2 897406
SERVO DRIVE 3 & 4 897406
SERVO DRIVE 5 & 6 897406
3000 MOTHER BOARD ASSY. 897517
REF: CARD CAGE BACKPLANE
CABLE ASSY. CL-610559
PEN MOTOR 896683
PM 1
PM 2
PM 3
PM 4
PM 5
PM 6
50MM
SEE VIEW A
ANNOTATION HEAD STANDARD CL-610594
(OPTIONAL) ANNOTATION HEAD 1 CL-610594
(OPTIONAL) ANNOTATION HEAD 2 CL-610594
(OPTIONAL) ANNOTATION HEAD 3 CL-610594
(OPTIONAL) ANNOTATION HEAD 4 CL-610594
(OPTIONAL) ANNOTATION HEAD 5 CL-610594
(OPTIONAL) EVENT MARKER 1 CL-710145
(OPTIONAL) EVENT MARKER 2 CL-710145
(OPTIONAL) EVENT MARKER 3 CL-710145
(OPTIONAL) EVENT MARKER 4 CL-710145
(OPTIONAL) EVENT MARKER 5 CL-710145
(OPTIONAL) INTERCHANNEL ANNOTATION DRIVES 1 & 2 CL-810191
(OPTIONAL) INTERCHANNEL ANNOTATION DRIVES 3 & 4 CL-810191
(OPTIONAL) INTERCHANNEL ANNOTATION DRIVES 5 & 6 CL-810191
EVENT MARKER STANDARD CL-710145
SIGNAL CABLE CL-710520-2
3000 MOTHER-IN-LAW BOARD ASSY. 897813
REF: TRANSPORT INTERCONNECT
OPTION STANDA
CABLE 897
CABLE CL-61

REVISIONS		
SYM.	DESCRIPTION	DATE



MODEL NO. 30-V7606-00

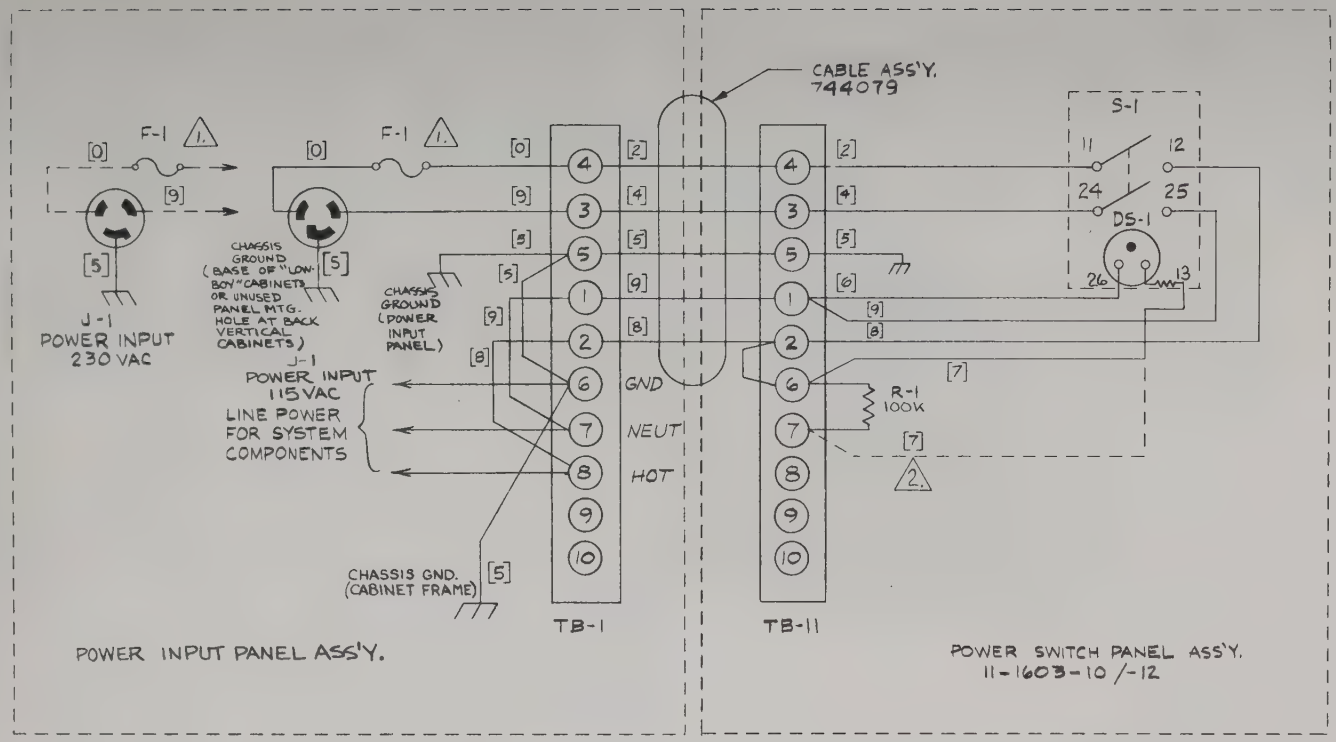
BY	DATE
DR KOCHIS	3-9-87
Survey	4/87
ENG	4/87

NAME SCHEMATIC OVERALL

CODE IDENT 96795 | ISSUE CODE G

Gould Inc
Instruments Division
Cleveland, Ohio 44114 U.S.A.

DWG NO CL-211531



3. [ ] = EIA COLOR CODE.

2. FOR 230V OPERATION MOVE WIRE [7] FROM TERMINAL 6 TO TERMINAL 7 OF TB-11.

1. FUSE RATING: 884208-1 & -5 (115 VAC) - 10A
884208-6 (230 VAC) - 5A

NOTES;

REQD	ITEM	PART NUMBER	DESCRIPTION	REMARKS	CML

LIST OF MATERIAL

S-2030

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING
.XXX = ± .005 SURFACE
.XX = ± .015 FINISH
.X = ± .06 ANGLES = ± 0° 30'
SEE WORKMANSHIP STD-TITLED "MFG. TOLERANCES & STD'S.," WHEN DESIRED INTENT IS NOT CLEARLY DEFINED ON DRAWING.

	BY	DATE
DR. FOWLER		5-25-73
CH.		
APP. KLOSS		9-17-73

MATL. NONE

NAME DIA., WIRING - POWER KIT

ADD. FIN NONE

ISSUE G CODE

SCALE NONE

Gould Inc.
Instruments Division
Cleveland, Ohio 44114 U.S.A.

DWG. NO. 384919

FED CODE NO. 96795

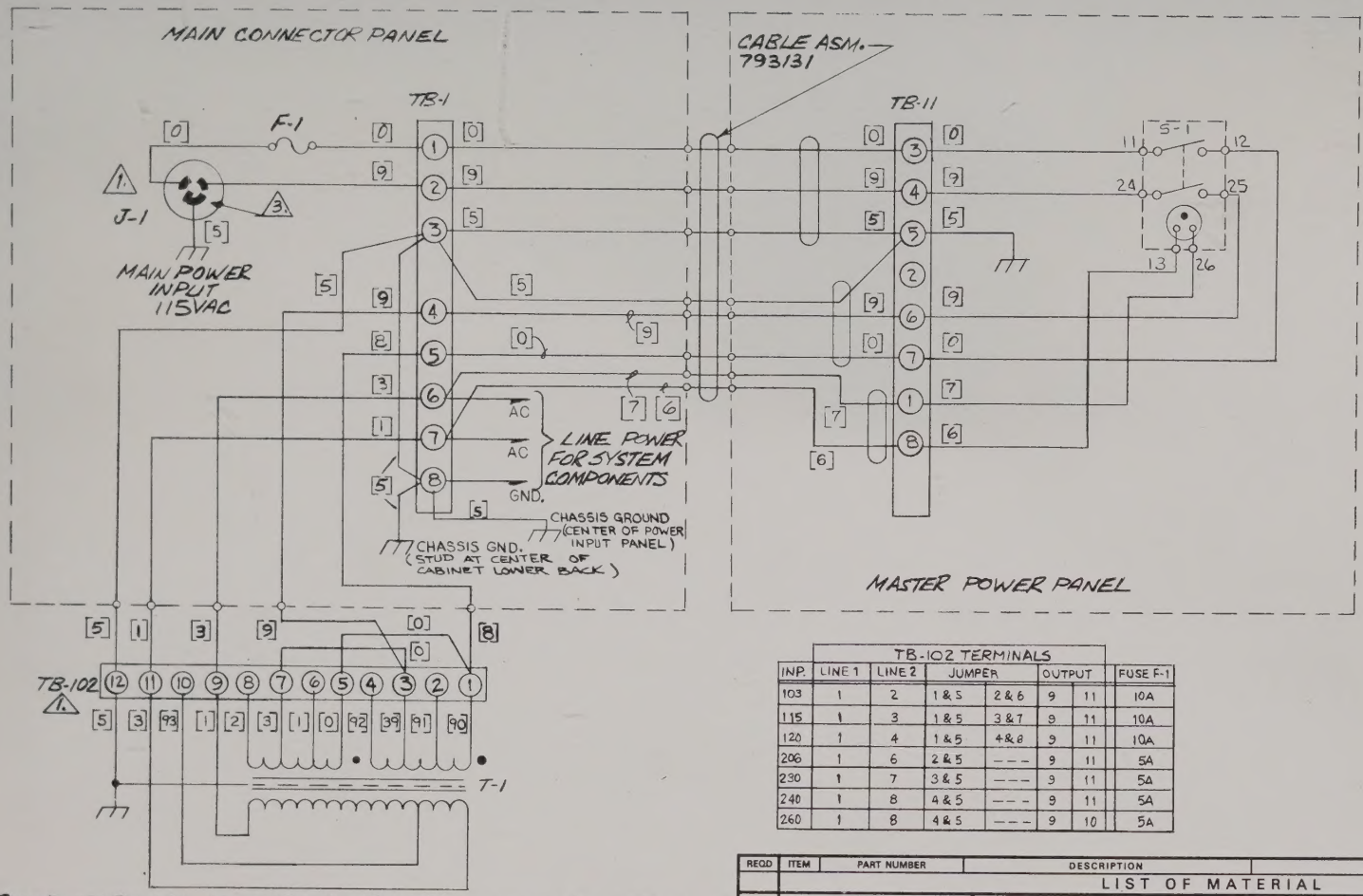
FIRST USE

384919

Form 3 19 1 79

other than those engaged in such activities without the express written consent of GOULD INC., INSTRUMENT SYSTEMS DIVISION.

H-1	REV'D TB-1 PER DCN 32541	RIVERA	12-11-85



	TB-102 TERMINALS						
INP.	LINE 1	LINE 2	JUMPER		OUTPUT		FUSE F-1
103	1	2	1 & 5	2 & 6	9	11	10A
115	1	3	1 & 5	3 & 7	9	11	10A
120	1	4	1 & 5	4 & 8	9	11	10A
206	1	6	2 & 5	---	9	11	5A
230	1	7	3 & 5	---	9	11	5A
240	1	8	4 & 5	---	9	11	5A
260	1	8	4 & 5	---	9	10	5A

3. GROUND TERMINAL MUST BE CONNECTED DIRECTLY TO BASE OF "LOWBOY" CABINETS OR TO UNUSED PANEL MOUNTING HOLE OF VERTICAL CABINETS.
2. [ ] = E.I.A. COLOR CODE.
1. TRANSFORMER SHOWN FOR 115VAC POWER INPUT.

NOTES:

REQD	ITEM	PART NUMBER	DESCRIPTION	REMARKS	CML
			LIST OF MATERIAL		

UNLESS OTHERWISE SPECIFIED	BY	DATE	NAME	Gould Inc. Instrument Systems Division Cleveland, Ohio 44114 U.S.A.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING .XXX = ± .005 SURFACE .XX = ± .015 FINISH .X = ± .06 ANGLES = ± 0° 30'	DR D BAILEY	5-1-79	WIRING DIAGRAM POWER KIT	
	CH	6-8-79		
	APP	6-8-79		
NEXT ASSY USED ON 893136 FIRST USE	ADD. FIN. NONE		FED. CODE NO. 96795	ISSUE CODE G
SEE WORKMANSHIP STD-TITLED "MFG. TOLERANCES & STD'S.." WHEN DESIRED INTENT IS NOT CLEARLY DEFINED ON DRAWING.			SCALE NONE	DWG. NO. 393130

393130

Form 3.19 1-76

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